

THE UNIVERSITY
OF ILLINOIS
LIBRARY

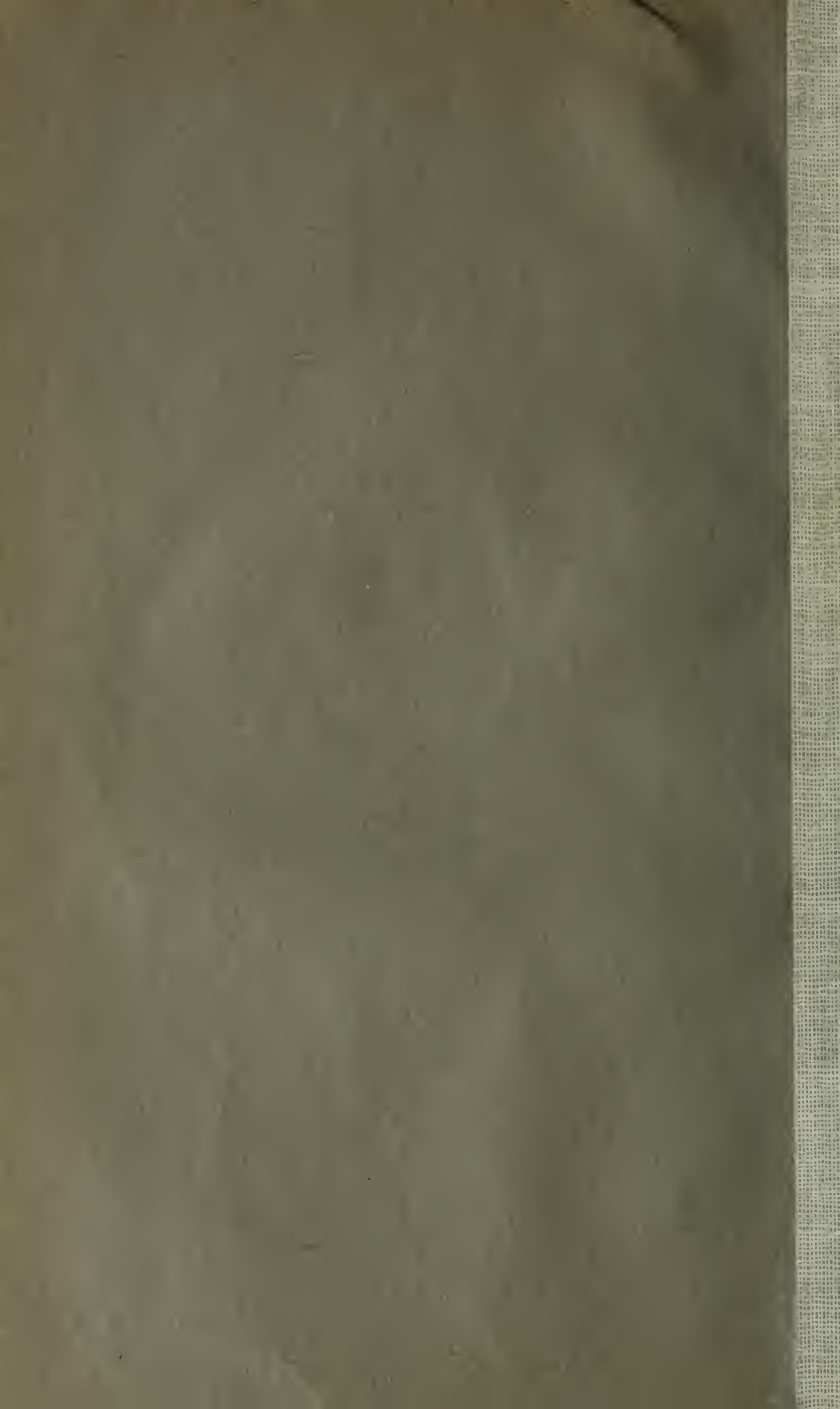
540.5

JOC

v. 70² pt 2

cop. 2





540.5

JOC

517

v. 70² 42

COR. 2

Inorganic Chemistry.

Electrolytic Formation of Hypochlorites and of Chlorates.

By FELIX OETTEL (*Chem. Centr.*, 1895, i, 592—593; from *Zeits. Elektrotechn. u. Elektrochemie*, 1895, 354—361, and 474—480).—The electrolysis of potassium chloride solutions was studied with the following apparatus. The current was obtained from four accumulators; in the circuit were arranged a copper voltameter for measuring the current, a voltameter for collecting the electrolytic gas, the cells in which the experiments were carried out, an ampère meter, and a resistance box. The gas voltameter was filled with caustic soda solution, and was provided with electrodes consisting of two concentric cylinders of nickel foil. The cell in which the actual experiments were performed had a capacity of about 115 c.c., and was closed by a sheet of rubber closely screwed down; through the rubber passed the electrodes (platinum foil and wire), a capillary delivery tube, and an ordinary glass tube reaching to the bottom of the cell and serving to empty or fill it. A current of 1—1.2 ampère was used, and was allowed to run for two hours. When neutral solutions are electrolysed, the main product is hypochlorite. At the end of the experiment 83 per cent. of the active chlorine exists as hypochlorite and 17 per cent. as chlorate. The addition of an alkali favours the decomposition of the water, and decreases the amount of hypochlorite formed, but increases the amount of chlorate. Raising the temperature has pretty much the same influence as the addition of alkali.

A less dense current at the cathode favours the reduction of hypochlorite, and has the greatest effect in a concentrated solution, either neutral or slightly alkaline; a diminution in the density of the current at the anode increases the amount of water decomposed; the difference is less marked in a strongly alkaline solution.

In an alkaline solution, the reduction is reduced to a minimum, and hence it is not necessary to use a diaphragm (membrane).

Sodium chlorate can be obtained in a similar manner; sodium hydroxide increases the amount of chlorate formed, even more than potassium hydroxide.

J. J. S.

Manufacture of Potassium Chlorate. By K. J. BAYER (*Chem. Zeit.*, 1895, 19, 1453—1455).—The author describes a new method for the manufacture of potassium chlorate. Chlorine is lead into a cream of zinc oxide and water; zinc oxychloride and hypochlorite are first formed, but, finally, a clear solution of zinc chloride and hypochlorite is obtained. The conversion of the hypochlorite into chlorate readily takes place when this solution is heated with the requisite quantity of potassium chloride, and the yield is almost theoretical. A still better method is to add the requisite quantity of potassium chloride to the zinc oxide and water before the chlorine is passed in, and then to keep the temperature at about 90—95° during the

chlorination. The resulting solution may be evaporated down to 30° Bé., when, on cooling, the greater part of the potassium chlorate crystallises out in nearly pure form. A further quantity may be obtained by concentrating the mother liquors to 60° Bé.

The final mother liquor is treated with hydrochloric acid, and then evaporated down till the zinc chloride solidifies. The mode of working and the appliances used are almost identical with those employed in the manufacture of potassium chlorate by the lime method.

J. J. S.

The Density of Oxygen. By EDWARD W. MORLEY (*Zeits. physikal. Chem.*, 1896, 20, 68—130).—Three series of determinations were made. In the first of these all necessary corrections were applied; in the second corrections for the expansion of the glass and thermometric corrections were eliminated as the gas was brought into pressure and temperature equilibrium with a similar flask containing the normal volume of hydrogen; whilst in the third series the temperature was throughout the experiment that of melting ice. The capacity of the flasks, internal, and external, were determined by (1) weight in air, (2) additional weight to maintain equilibrium, when the flask was immersed in water; (3) loss of weight when filled with water and weighed in water of equal temperature. The oxygen employed was prepared from potassium chlorate, and also in the third series by electrolysis, and every precaution observed to ensure purity. The author estimates the quantity of nitrogen present to be not more than 1/30,000, and of chlorine not more than $\frac{1}{20}$ milligram in 20 litres, whilst the carbonic anhydride, and mercury vapour are also quite negligible. The details of the apparatus used, of the filling and evacuation of the flasks, &c., and the experimental numbers are given in the paper. The agreement of the several experiments indicate the very great care with which the determinations were made, the final results being

- (1). $D = 1.42879 \pm 0.000034$ (mean of 9).
- (2). $D = 1.42887 \pm 0.000048$ (mean of 15).
- (3). $D = 1.42917 \pm 0.000048$ (mean of 24).

The author considers that of these the third should receive double weight, and hence obtains as a mean of the whole series $D = 1.42900 \pm 0.000034$ (Abstr., 1895, ii, 261).

L. M. J.

Tubular Ozone Generator. By GASTON SÉGUY (*Compt. rend.*, 1896, 122, 1120—1121).—Each generator consists of a glass tube containing seven narrow tubes, each of which has a spiral of aluminum wire inside and outside. The inside spirals are all connected with a single wire which passes to the outside of the large tube, whilst the external spirals are similarly connected with another wire. These wires are respectively connected with the two poles of an induction coil. Three or more of the generators may be connected in series, and 170 milligrams of ozone per hour can be obtained from air, and 250 milligrams per hour from oxygen.

C. H. B.

Formation of Persulphuric acid. By KARL ELBS and O. SCHÖNHERR (*Chem. Centr.*, 1895, i, 591—592; from *Zeits. Elektro-techn. u. Electrochemie*, 1895, 417—420 and 468—472).—The authors have determined the relationship between the amount of persulphuric acid formed, and the concentration of the sulphuric acid which is electrolysed. The persulphuric acid was estimated by pouring 5—10 c.c. of the liquid into 200—300 c.c. cold water, adding a given quantity of ferrous ammonium sulphate and titrating back with potassium permanganate. If the density of the sulphuric acid is below 1·2, very little persulphuric acid is formed; the maximum amount is obtained when the acid has a sp. gr. = 1·35—1·5. The persulphuric acid is formed by the union of HSO_4 ions at the anodes, and is not due to oxidation, since the amount formed is greater with a stronger current, whereas if it were a simple oxidation product the amount formed would decrease with an increase in the strength of the current. Too great a concentration of the acid retards the formation of persulphuric acid for several reasons:—(1) Concentrated acid is a bad conductor; (2) the molecules of $\text{H}_2\text{S}_2\text{O}_8$ when formed in a concentrated acid are not so free to move as in the more mobile dilute acid, and hence remain a longer time at the anode and become decomposed; (3) with concentrated acid, the amount of heat developed is greater and hence destroys a greater number of persulphuric acid molecules.

When a strong current is passed through a moderately dilute acid, it is broken. On warming, however, the electrolysis begins anew. This stoppage is caused by the accumulation of too many ions, and the formation of a coating of the non-conducting $\text{H}_2\text{S}_2\text{O}_8$ molecules round the anode.

The amount of persulphuric acid formed is also diminished by increase of temperature; at 60° it is decomposed as rapidly as formed. With dilute acid (sp. gr. < 1·3) practically no hydrogen peroxide is formed by the decomposition of the persulphuric acid, the amount of peroxide, however, increases with the strength of acid.

When diluted with 50 times its volume of cold water, persulphuric acid is not decomposed.

J. J. S.

Persulphuric acid. By KARL ELBS (*Chem. Centr.*, 1895, ii, 476—477; from *Zeits. Electro-techn. u. Electrochemie*, 1895, 162—163).—In order to demonstrate the formation of persulphuric acid and of its potassium salt, a wide test tube is filled with the electrolyte, the anode being a platinum wire enclosed for the greater part of its length in a glass tube, and the cathode a platinum ring. A wider tube, surrounding the anode, collects the bubbles of gas evolved and prevents their reaching the cathode. The whole apparatus is placed in a beaker of cold water. A current of 100 ampères per square metre anode surface is used. With sulphuric acid of sp. gr. 1·4, persulphuric acid can be detected in the liquid round the anode after five minutes. With a cold saturated solution of potassium sulphate in dilute sulphuric acid, a considerable amount of crystallised potassium persulphate is obtained at the end of 10 minutes. The ammonium salt requires a longer time. The same apparatus may be used for

showing the conversion of cobaltous into cobaltic salts. The author also proves that Darrieus and Schoops' hypothesis of lead accumulators (compare *Chem. Centr.*, 1895, i, 522) is not tenable; since lead dioxide is only formed by persulphuric acid in nearly alkaline solutions.

J. J. S.

Position of Tellurium in the Periodic System. By JAN W. RETGERS (*Zeits. anorg. Chem.*, 1896, 12, 98—117).—A controversial paper dealing with the results published by Staudenmaier (this vol., ii, 96).

E. C. R.

Hyponitrous acid. By ARTHUR R. HANTZSCH (*Ber.*, 1896, 29, 1394).—The author in conjunction with Ludwig Kaufmann, has prepared hyponitrous acid in the solid form, together with an ethereal salt and the ammonium salt. Further details will shortly be published. (Compare Tanatar, this vol., ii, 417.)

A. H.

Action of Hydrogen Bromide on Thiophosphoryl Chloride. By ADOLPHE BESSON (*Compt. rend.*, 1896, 122, 1057—1060).—Carefully purified thiophosphoryl chloride melts at -35° . It is not attacked at its boiling point by hydrogen bromide, but if the gas mixed with vapour of the thiophosphoryl chloride is passed over pumice heated at $400-500^{\circ}$, decomposition takes place, and the product contains the three derivatives, PSCl_2Br , PSClBr_2 , and PSBr_3 , which can only be separated by careful fractionation under low pressure.

Thiophosphoryl bromodichloride, PSCl_2Br , boils at about 80° under a pressure of 6 mm.; sp. gr. = 2.12 at 0° . When strongly cooled, it forms a white solid, which melts at -30° . It decomposes slowly in presence of water, more rapidly in contact with solutions of alkalis. Fuming nitric acid oxidises it violently, but the acid of 36° acts more slowly, and completely oxidises the sulphur and phosphorus. When heated at 100° , it decomposes into the thiophosphoryl trichloride and the chlorodibromide, the latter, in its turn, decomposing and yielding, amongst other products, thiophosphoryl tribromide.

Thiophosphoryl chlorodibromide, PSClBr_2 , boils at about 95° under a pressure of 60 mm., and has properties very similar to those of the preceding compound. When solidified it melts at -6° ; sp. gr. = 2.48 at 0° .

C. H. B.

Isolation of Lithium and of Beryllium. By WILHELM BORCHERS (*Chem. Centr.*, 1895, ii, 13—14; from *Zeits. Elektrotechn. u. Elektrochemie*, 1895, 39—40).—In the treatment of minerals containing lithium, the solution of the chlorides of the alkalis and alkaline earths is made slightly alkaline and evaporated in an iron vessel, then fused with ammonium chloride to render it neutral, and electrolysed with a current of 1,000 ampères per square metre of cathode surface and 5 volts. The upper rim of the iron crucible is kept cool by the circulation of cold water, and a thin crust of solid material is formed on the surface, which prevents the metallic lithium from coming into contact with the atmosphere. The metallic globules are placed

in a paraffin bath at 130--200°, when the pure metal rises to the surface.

Beryllium chloride solutions are evaporated down with an alkali chloride and ammonium chloride, and then electrolysed in the same manner as magnesium chloride. Calcium and magnesium chlorides must not be present. The temperature must also be kept as low as possible, as otherwise the beryllium forms an alloy with the iron of the crucible.

J. J. S.

Electrolytic Silver Peroxide. By OTTOKAR ŠULC (*Zeits. anorg. Chem.*, 1896, 12, 89—97).—The author has investigated the black deposit consisting for the most part of silver peroxide, which is formed during the electrolysis of silver nitrate between platinum electrodes. A platinum dish is employed as the cathode, whilst the anode consists of a piece of platinum foil cut in the form of a comb, and then rolled up. A 15 per cent. silver nitrate solution is employed, and a current of 0·06 ampère, the density at the cathode being 0·0033 ampère per centimetre. The electrolysis is allowed to continue for 3—4 hours; the silver solution, which has become contaminated with about 4 per cent. of free nitric acid, is then removed, and the electrolysis again continued. The crystalline deposit on the anode is brushed off with a glass rod and washed with water until the wash-water gives no opalescence with hydrochloric acid. The product, on analysis, gave numbers agreeing with the formula $\text{Ag}_7\text{NO}_{11}$. It forms beautiful, black octahedra, having a metallic lustre and a sp. gr. = 5·65. It is fairly stable in dry air at the ordinary temperature, and loses its lustre only after remaining some months. When quickly heated, it decomposes into a voluminous, dark brown powder, with evolution of oxygen, and this decomposition takes place with the crystalline compound at 155°, with the powdered compound at 162°. At an incipient red heat, a further decomposition takes place, red fumes are evolved, and metallic silver is formed. It is only slightly decomposed by water at ordinary temperatures, and after some time silver nitrate goes into solution; when boiled for 1½ days with water, the silver is deposited in the form of a mirror. When boiled with alcohol, aldehyde is formed and a mirror deposited, and if a small quantity of ammonia is added, a very beautiful mirror is obtained. It is completely decomposed by oxalic acid, with evolution of carbonic anhydride, and by ammonia, with evolution of nitrogen. It dissolves in nitric acid with a dark brown coloration, and in sulphuric acid with a dirty green coloration; both solutions go colourless on heating, diluting, and on remaining. The oxygen evolved during the first decomposition which takes place, on heating, is 7·69 per cent. The percentage of nitrogen (1·40 per cent.) corresponds with a percentage of silver, as AgNO_3 , of 12·61, and this agrees with the analysis of the residue obtained by decomposing the product with hot water. Whence the author deduces the formula $3\text{Ag}_2\text{O}, \text{AgNO}_3$.

E. C. R.

Experiments with Silver Sulphide. By THEODOR GROSS (*Chem. Centr.*, 1895, ii, 353—354; from *Elektro-chem. Zeits.*, 1895,

80—81).—Silver sulphide, when brought into contact with a platinum cathode in dilute sulphuric acid, is converted into a grey mass, the gas evolved from the cathode yields, with silver nitrate solution, a greyish-black precipitate consisting of glistening plates. A similar precipitate is obtained by treating silver nitrate with electrolysed sulphuric acid. Both precipitates differ from silver sulphide, Ag_2S , in properties. The author has treated the precipitate with nitric acid, and then fused it with potash, when decomposition ensues, but its constitution has not been determined.

Silver sulphide, mixed with 3—4 times the amount of silver nitrate, then with nitric acid (sp. gr. 1.4), and evaporated to dryness and ignited, also yields a grey mass, which the author has treated with nitric acid and other reagents with no definite results (compare this vol., ii, 472).
J. J. S.

Crystals produced in the Dephosphorisation of Iron. By ADOLPHE CARNOT (*Ann. des Mines*, 1895, [9], 8, 300—310; compare Abstr., 1884, 157, 520).—In the basic slags produced in the Thomas-Gilchrist process the following kinds of crystals have been found: (1) brown rectangular (orthorhombic) tablets with the composition $\text{P}_2\text{O}_5, 4\text{CaO}$; (2) brown and black hexagonal needles of much the same composition, but with 3—4 per cent. of silica; (3) brilliant, blue, orthorhombic crystals with the formula $\text{P}_2\text{O}_5, \text{SiO}_2, 5\text{CaO}$ or $\text{P}_2\text{O}_5, 3\text{CaO} + \text{SiO}_2, 2\text{CaO}$. Hilgenstock has supposed these to be trimorphous, but the differences in composition, especially as regards silica, are against this view. A new analysis has been made of the first kind of crystals, which were obtained from the basic slags of Kladno, Bohemia.

P_2O_5 .	SiO_2 .	CaO .	MgO .	FeO .	Al_2O_3 .	Total.
37.67	0.74	59.54	trace	1.44	0.37	99.76

This analysis is compared with that of similar crystals from Middlesbrough examined by Stead and Ridsdale (*Trans.*, 1887, 601).
L. J. S.

Reduction in Neutral Solutions. By CARL KIPPENBERGER (*Chem. Zeit.*, 1895, 19, 1269—1270).—The author has studied the action of pure metals on carbonic anhydride solution in the absence of acids, and also on metallic carbonates, his results confirm those already published by Lieben (Abstr., 1895, ii, 348). Powdered magnesium has the power of decomposing a solution of magnesium sulphate, a quantity of magnesium hydroxide corresponding with the amount of magnesium originally in solution as sulphate, is precipitated, and the metallic magnesium which was added dissolves with evolution of hydrogen. Metallic lead has a very similar action on a solution of lead nitrate. In the case of those metals whose oxides are readily reduced, no free hydrogen escapes, it being used up in the nascent states in the reduction of the metallic oxide; in other cases it is used up in the reduction of the acid radicle. For example, when metallic magnesium decomposes a solution of lead nitrate, a

small quantity of hydrogen is evolved, but the greater part is used up in the reduction of the lead hydroxide and of the nitric acid.

When a metal is added to a solution of an acid salt, the excess of acid is first decomposed, and then the acid formed by the ionisation of the normal salt. A good example of this is the decomposition of a bicarbonate solution by means of aluminium. The author states that the chemically active carbonic acid has the formula H_2CO_3 (compare Lieben, *loc. cit.*); under certain conditions small quantities of formaldehyde and formic acid can be obtained in the reduction of carbonic acid.

Magnesium, aluminium, and zinc readily reduce solutions of nitrates and chlorates. In a dilute solution of a nitrate, the first reduction product is a nitrite, then hydroxylamine, and finally ammonia; these primary reduction products can, however, interact with one another to yield secondary reduction products, such as nitrous oxide, nitric oxide, nitrogen, water, &c. A chlorate is first reduced to a chlorite, but this is immediately decomposed into chloride and chlorate; this chlorate is again reduced in a similar manner, so that the final product consists almost entirely of chloride.

J. J. S.

Lead Sulphiodide. By VICTOR LENHER (*J. Amer. Chem. Soc.*, 1895, **17**, 511—513).—When hydrogen sulphide is added to a solution of $\text{PbI}_2, 2\text{KI}$, or of $\text{PbI}_2, 4\text{KI}$, in potassium iodide, a brick-red coloured precipitate is obtained; on addition of more hydrogen sulphide, the precipitate changes through dark red to brown, and finally to the black sulphide. The red precipitate was obtained pure on the addition of a saturated hydrogen sulphide solution to a strong solution of lead iodide in a saturated solution of potassium iodide. The precipitate was filtered, washed with a saturated solution of potassium iodide, then thoroughly with cold water, afterwards with absolute alcohol, with carbon bisulphide to remove any sulphur, and again with alcohol, and finally dried by drawing air over it. The substance has a great tendency to decompose into lead sulphide and lead iodide, and it is advisable to prepare only small quantities at a time. The composition is represented by the formula $\text{PbS}, 4\text{PbI}_2$.

It is readily decomposed by heat, acids, alkalis, and even by long exposure to light.

J. J. S.

Enamel. By OSKAR EMMERLING (*Ber.*, 1896, **29**, 1549).—Most of the enamels used for coating iron contain silica, boric acid, alumina, and alkalis, and, if white in colour, stannic oxide. A sample of French manufacture has been found to have the percentage composition:— SiO_2 , 36.69; PbO , 52.51; K_2O , 6.33; Na_2O , 0.60; As_2O_5 , 3.74; CoO , traces; the white appearance being obtained by means of lead arsenate instead of stannic oxide. Such an enamel is readily attacked, even by dilute acids, and is obviously not to be recommended for culinary utensils.

C. F. B.

Reduction of Copper Sulphide. By DELIA STICKNEY (*Amer. Chem. J.*, 1896, **18**, 502—504).—Copper sulphide is nearly completely reduced to copper when heated in contact with the flame of a Bunsen burner.

A. G. B.

Action of Nascent Iodine on Mercuric Chloride. By M. C. SCHUYTEN (*Chem. Zeit.*, 1895, **19**, 1683).—In order to study the action of nascent iodine on mercuric chloride, the author has treated the chloride with an ethereal solution of iodoform. The two were used in molecular proportion, and were left in contact for several days in loosely stoppered bottles. Brilliant, red, octahedral crystals of mercuric iodide were obtained in almost theoretical quantity. The yield is much smaller when the iodine is not in the nascent state.

J. J. S.

Barium Tetrachromite. By E. DUFAU (*Compt. rend.*, 1896, **122**, 1125—1127).—Equal weights of chromic oxide and barium oxide are intimately mixed and heated in a crucible brasqued with barium oxide in the electric furnace in an arc from a current of 50 volts and 300 ampères for 10 minutes. The fused product, after cooling, is repeatedly treated with hydrochloric acid, and the residue is a mixture of green lamellæ of chromic oxide, and small, brilliant, black crystals of *barium tetrachromite*, $\text{BaO} \cdot 4\text{Cr}_2\text{O}_3$, which can be separated by levigation. The crystals of the tetrachromite seem to belong to the hexagonal system, and are slightly harder than quartz; sp. gr. = 5.4 at 15°.

The tetrachromite is very stable, and is slowly attacked by chlorine or bromine at a bright red heat, with formation of a barium salt and chromic oxide; iodine seems to have no action under these conditions. Water vapour at a bright red heat, and sulphur at the softening point of glass, are without action, and the tetrachromite is also not attacked by hydrofluoric, hydrochloric, nitric, and sulphuric acids. It is, however, slowly decomposed by dry hydrogen fluoride or hydrogen chloride at a red heat.

The tetrachromite is readily converted into chromate, the change taking place with incandescence in oxygen below a red heat, and also, though slowly, in air. Fused oxidising agents and alkali hydroxides and carbonates produce a similar result.

C. H. B.

Behaviour of Aluminium with Ammonium Compounds. Method of producing Chemical Change on the surface of Commercial Aluminium. By CHRISTIAN GÖTTIG (*Ber.*, 1896, **29**, 1671—1673).—Aluminium dissolves with comparative readiness in ammonia, provided the solution is sufficiently dilute, the evolution of hydrogen being readily perceptible in solutions containing only 0.025 per cent. of ammonia; the ammonium aluminate which is first formed is unstable and readily decomposes into aluminium hydroxide and ammonia. The addition of ammonium salts, or of a little acid, facilitates the solution of the metal, but in this case there is little or no evolution of hydrogen, and the surface of the metal is lighter than when ammonia alone is employed. The other constituents of commercial aluminium are not acted on by ammonia, and consequently the surface of any aluminium object, treated as above, is less readily affected by chemical or mechanical agents than the original metal.

J. B. T.

✓ **Chromium Salts.** By WILLIS R. WHITNEY (*Zeit. physikal. Chem.*, 1896, 20, 40—67).—The cause of the colour change in solutions of chromium sulphate was investigated, (1) by the alteration of conductivity on the addition of sodium or barium hydroxide, (2) by the action of the salt in effecting hydrolysis of methylic acetate. The first series of experiments indicate that one-sixth of the sulphate in the green solution is present as free sulphuric acid, and one-third as SO_4 ions, a result agreeing with Recoura's conclusion that the salt $[\text{Cr}_4\text{O}(\text{SO}_4)_4]\text{SO}_4$ is formed during the colour change. The catalytic experiments show that the green solution possesses a hydrolysing power equal to that of a mixture of one-sixth the equivalent of free acid with the corresponding amounts of the violet salt. The electrical conductivity of chromo-mono-sulphuric, -disulphuric, and -trisulphuric acids were determined, and in each case found to be equal to the conductivity of a solution of equal sulphuric acid concentration. The effects of dilute green solutions of the chloride, nitrate, sulphate, and acetate on the rate of sugar inversion were also measured in order to determine the quantity of hydrolytically dissociated acid, but owing to the unknown effect of the other ions present, accurate results were impossible. The colloidal chromo-sulphuric acid of Recoura was investigated, and as the conductivity of solutions of the composition $\text{Cr}_2(\text{SO}_4)_3, x\text{H}_2\text{SO}_4$ were always equal to those of $(x - 1)\text{H}_2\text{SO}_4$ the colloidal compound is $\text{Cr}_2\text{H}_2(\text{SO}_4)_4$. The constitution of these salts, according to the theory of Werner (*Abstr.*, 1893, ii, 379) is considered, and the author points out that five out of the seven salts indicated by the theory, are known. (See *Abstr.*, 1894, ii, 382; 1893, ii, 528.) L. M. J.

Uranium. By HENRI MOISSAN (*Compt. rend.*, 1896, 122, 1088—1093).—The author has prepared metallic uranium (1) by the action of sodium on the double sodium uranium chloride, $\text{UCl}_4, 2\text{NaCl}$, in an iron tube, (2) by the electrolysis of the fused double chloride with carbon or iron electrodes, and a current of 8 to 10 volts and 50 ampères. The double chloride is obtained by the action of uranium chloride vapour on sodium chloride at a dull red heat, the uranium chloride being formed in the same tube by the action of chlorine on uranium carbide. Unlike the simple chloride, it is not very hygroscopic, and is practically non-volatile when fused.

The metal is, however, best obtained by mixing 500 parts of the oxide U_3O_8 with 40 parts of sugar carbon, and heating the mixture in a carbon tube, closed at one end, in an electric furnace, with a current of 800 ampères and 45 volts. The product contains a small quantity of carbon, which can be partially removed by heating it in a crucible brasqued with uranium oxide, and enclosed in a larger crucible brasqued with titanium to protect the uranium from the action of nitrogen.

When pure, uranium is white, takes a high polish, and can be worked with a file. It is not magnetic, and is much more volatile than iron. When finely divided, it decomposes water slowly at the ordinary temperature, and more rapidly at 100° . It burns in fluorine at the ordinary temperature, in chlorine at 180° , in bromine at 210° , and in iodine vapour at about 260° . It is also attacked by

hydrogen chloride and hydrogen iodide at a red heat. When finely divided, it burns in oxygen at 170° , in sulphur vapour at about 500° , and also in selenium vapour.

One of the most remarkable properties of the metal is its great tendency to combine with nitrogen. When heated in this gas at 1000° , it becomes covered with a yellow nitride, and the powdered metal decomposes ammonia above a dull red heat, with liberation of hydrogen and formation of a black, crystalline powder. C. H. B.

Tungstates and Molybdates of the Rare Earths. By FANNY R. M. HITCHCOCK (*J. Amer. Chem. Soc.*, 1895, **17**, 483—494 and 520—534).—The author has continued the investigations of Smith and Bradbury (*Abstr.*, 1892, 241), in the hopes of finding a good method for the separation of molybdic and tungstic acids. Pure sodium molybdate, $\text{Na}_2\text{MoO}_4 + 2\text{H}_2\text{O}$, was used in the experiments, and the corresponding tungstate; the latter, however, was not pure, but contained silica, ferric iron, and molybdates. It was found best not to prepare more than 250 c.c. of the tungstate solution, as it gradually attacks glass, and a sediment resembling silica is deposited. Experiments made with sodium tungstate and manganese sulphate showed that tungstic acid cannot be quantitatively precipitated from its salts by means of manganese salts.

Uranium acetate does not precipitate tungstic acid from its salts, but both uranyl nitrate and chloride precipitate the acid completely in the form of uranium tungstate, the precipitation also takes place in the presence of ammonium salts and alcohol. With a little care tungstic acid may be estimated volumetrically by means of uranyl nitrate solution, if potassium ferrocyanide is used as an indicator.

Sodium molybdate gives no precipitate with uranium acetate; with the nitrate, it yields a precipitate which almost completely dissolves on stirring. Uranyl chloride also gives a precipitate which redissolves on stirring; on standing, however, a pale lemon-yellow precipitate is formed, which goes into solution on boiling. On the addition of an excess of uranyl chloride to the cold molybdate solution, a similar yellow precipitate is obtained; it does not redissolve, but, when heated for an hour, grows denser, and gradually becomes crystalline. The crystals are insoluble in water, and after drying at 128° have the composition $\text{UO}_2:\text{MoO}_4$. The author has found it impossible to effect a complete separation between tungstic and molybdic acid by means of uranium salts.

Sodium molybdate solution gives a precipitate with cerium salts, but the amount of *cerium molybdate* thus obtained is not theoretical, as part remains in solution, the addition of alcohol completes the precipitation, but is also liable to throw down other cerium salts which may be in solution. Sodium tungstate behaves in a very similar manner with cerium salts.

Tungstates of neodymium and of *praseodymium* were obtained by treating the sodium salts with neodymium and praseodymium chloride respectively. They form gelatinous precipitates; which are very difficult to filter and wash, as they show a strong tendency to pass through the pores of the filter paper. The *molybdates* when heated gradually

become granular, and are then more easily filtered. Neodymium tungstate has a very pale rose tint before ignition, which changes to lavender colour after ignition. Praseodymium tungstate has a decided greenish-yellow tint both before and after ignition. The colours of the molybdates are similar to those of the tungstates, but deeper in tint. With the praseodymium salts, the solubility increases with a rise in temperature, but with neodymium tungstate, the solubility decreases as the temperature rises. Details as to analyses are given.

The precipitation of both molybdic and tungstic acids by neodymium chloride is practically quantitative, whereas that of molybdic acid with praseodymium chloride is not.

Sodium tungstate solution yields with lanthanum chloride, in the presence of alcohol, a precipitate, which, on drying, has a delicate blue colour. J. J. S.

Zirconium Sulphite. By FRANK P. VENABLE and CHARLES BASKERVILLE (*J. Amer. Chem. Soc.*, 1895, **17**, 448—453).—The authors have not succeeded—except in one case—in obtaining any zirconium sulphite corresponding with the acid, or normal, salts, only indefinite compounds or mixtures of the sulphite with the hydroxide have been prepared. A $2\frac{1}{2}$ per cent. solution of the pure chloride, neutralised with ammonia and then saturated with sulphurous anhydride, yields a white precipitate, which, after a time, redissolves; if the clear solution thus obtained be diluted with several times its volume of water and then boiled, a heavy, white precipitate is produced. When dried and powdered, it resembles finely divided silica; the ratio of zirconium to sulphurous anhydride was 2:1.

Freshly prepared zirconium hydroxide was also treated with a concentrated solution of sulphurous anhydride and kept for three months, with occasional shaking, a layer of gelatinous hydroxide was deposited on the bottom of the vessel, and upon this a white, finely divided substance formed.

The white layer was analysed, and the ratio of zirconium to sulphurous anhydride was found to be 2.2:1.

The supernatant liquor was found to contain zirconium, and when evaporated over sulphuric acid, gave a small quantity of hard, white nodular crystals, in appearance resembling zirconium sulphate. The results of analysis proved them to be a hydrated sulphite, $\text{Zr}(\text{SO}_3)_2 + 7\text{H}_2\text{O}$.

The precipitate obtained by boiling a solution of the chloride with a solution of sodium sulphite was also analysed. The ratio of zirconium to sulphurous anhydride was found to be 4:1. No definite thiosulphate could be obtained by treating the chloride with sodium thiosulphate under varying conditions. J. J. S.

Action of Air and Nitric Peroxide on some Halogen Bismuth Compounds. By V. THOMAS (*Compt. rend.*, 1896, **122**, 1060—1062).—When heated gently in nitric peroxide, bismuth tribromide is converted into small, very brilliant, white lamellæ of the oxybromide BiOBr . No further loss of bromine takes place, even at a high temperature. If heated strongly in air, however, it loses bromine, and is only very imperfectly converted into the oxide

When the tribromide is heated with free exposure to air, the greater part volatilises, and the residue consists of the oxybromide. The triiodide, when heated in nitric peroxide, is first converted into the oxyiodide, and subsequently into the oxide, and the same products are formed.

Bismuth dichloride, obtained by the action of chlorine on the metal, is a black, crystalline mass, which is converted into the oxychloride by nitric peroxide in the cold, although a gentle heat accelerates the reaction. When heated in presence of air, a large part of the dichloride volatilises, but the residue has the composition and properties of the oxychloride, BiOCl . (Compare Abstr., 1895, ii, 495.)

C. H. B.

Precipitation of the Sulphides of Platinum: Colloïdal Platinic Sulphide. By UBALDO ANTONY and ADOLFO LUCCHESI (*Gazzetta*, 1896, 26, i, 211—218).—The whole of the metal is precipitated from a 3 per cent. aqueous solution of hydrogen platinochloride by hydrogen sulphide at 90° as pure platinic sulphide, PtS_2 ; for analytical purposes, the precipitate should be collected and washed in an atmosphere of hydrogen sulphide, and dried in nitrogen at 70 — 80° . The sulphur cannot be estimated by the authors' modification of Carius's method (Abstr., 1890, 1216), owing to the formation of barium platinochloride, which is not easily separated from the barium sulphate, nor by treatment with chlorine and bromine, for then halogen compounds of platinum volatilise, as in the case of iridium (Abstr., 1893, ii, 379).

At ordinary temperatures (15 — 18°) a mixed yellow and brown precipitate is slowly thrown down by hydrogen sulphide from the hydrogen platinochloride solution, and the supernatant liquid remains red; the mixed precipitate continually loses hydrogen sulphide on heating, and ultimately yields platinic sulphide at 200° . The brown and yellow precipitates are possibly platinic hydrosulphides.

The reddish mother liquor contains colloïdal platinic sulphide, which is slowly deposited even at 0° . A 0.5 per cent. aqueous solution of hydrogen platinochloride gives no precipitate at 15 — 18° with hydrogen sulphide, but only a red-brown coloration; no precipitate is obtained on boiling, but on adding hydrochloric acid, the solution deposits platinic sulphide, and becomes decolorised. The precipitation of platinic sulphide from the more concentrated solution at 15 — 18° thus seems due to the action of the liberated hydrochloric acid.

W. J. P.

Mineralogical Chemistry.

Hyacinth (Quartz) in Gypsum, near Jena. By E. ZSCHIMMER (*Tsch. Min. Mitth.*, 1896, 15, 457—465).—Small, red, doubly-terminated crystals of quartz occur with small crystals of dolomite in gypsum bands in the Trias beds near Jena; they enclose gypsum, and probably also anhydrite. Experiments show that silica is fairly

soluble in a solution of magnesium hydrogen carbonate (10 litres containing 1·3342 gram SiO_2 , and 15·191 grams MgCO_3), and that, when calcium sulphate is added to this solution, about 35 per cent. of the silica is deposited. The origin of the quartz crystals in the gypsum is therefore attributed to the action of such a solution on beds of anhydrite.

L. J. S.

A new Cobalt Mineral. By PABLO MARTENS (*Actes Soc. Sci., Chili*, 1895, 5, 87—88).—The mineral is black and amorphous; streak, black; fracture, conchoidal; sp. gr., 3·39; $H = 3\cdot5$. With hydrochloric acid it gives off chlorine; over sulphuric acid some water is lost. Analysis gave

Co.	Cu.	SiO_2 .	Fe_2O_3 .	H_2O (hygroscopic).	H_2O (combined).	O [diff.]
46·76	12·65	1·76	0·29	4·92	14·08	[19·54]

This agrees with $\text{CuO}, 2\text{CoO}, \text{Co}_2\text{O}_3 + 4\text{H}_2\text{O}$. The exact locality is not known, but is probably in the north of Chili. The mineral is named *Schulzenite*, after J. Schulze, in whose collection it was found.

L. J. S.

Formation of Tin Veins. By FERDINAND GAUTIER (*Actes Soc. Sci., Chili*, 1895, 5, 82—84).—From the non-occurrence of minerals containing fluorine in the cassiterite veins of some districts of Bolivia, the author supposes the tin dioxide to have been formed by the interaction of water vapour and tin chloride. The cassiterite of another Bolivian locality shows impressions of quartz crystals; this seems to imply that there has here been interaction between water vapour and tin fluoride, the quartz being acted on by the hydrogen fluoride formed, and removed as silicon fluoride; minerals containing fluorine are, however, in this case also absent.

L. J. S.

Origin of Nitrates in Griqualand West. By R. MARLOTH (*Trans. S. African Phil. Soc.*, 1896, 8, 113—118).—Under cliffs and in caves in the Asbestos Mountains and the Doornbergen of S. Africa, there are deposits of nitrates, which have their origin in the nitrification (by microbes) of animal refuse, principally the fæces of rock rabbits; the potassium has partly been supplied by the animal matter, and partly derived from the associated rocks. The deposits contain calcium sulphate, indicating that the potassium nitrate has been formed by the interaction of calcium nitrate and potassium sulphate.

L. J. S.

Aluminium and Potassium Phosphates. By ADOLPHE CARNOT (*Ann. des Mines*, 1895, [9], 8, 311—320).—An analysis of a specimen of “minervite,” from Dépt. Hérault, very similar in appearance to the aluminium and potassium phosphate from the cavern of Tour-Combes, Oran (this vol., ii, 34), gave the following results, which are almost the same as those obtained for the mineral from the latter locality, but which differ, especially in the presence of potassium, from those shown in Gautier’s analysis of the minervite of Hérault (*Abstr.*, 1893, ii, 419, 577). The author, therefore, considers minervite, not as a hydrated phosphate of aluminium alone, but of aluminium

and potassium, in which part of the aluminium is replaced by iron, and part of the potassium by ammonium, calcium, and magnesium.

P_2O_5 .	Al_2O_3 .	Fe_2O_3 .	K_2O .	CaO .	MgO .	NH_4 .	H_2O (at 180°).
37.28	18.59	0.83	8.28	1.40	0.33	0.52	23.70

Loss from 180° to redness.	Sand, &c.	F, Cl, SO_3 .	Total.
4.50	4.35	traces	99.78

Formula, $P_2O_5 + 0.70(Al, Fe)_2O_3 + 0.25(K_2, Am_2, Ca, Mg)_2O_2 + 5.40H_2O$. This is nearly the composition of a mixture of Al_2O_3, P_2O_5 , with mono- and di-basic phosphates of the other bases.

L. J. S.

Thaumasite. By FÉLIX PISANI (*Bull. Soc. fran. Min.*, 1896, 19, 85—87).—The thaumasite from Paterson, New Jersey, recently described by Penfield and Pratt (this vol., ii, 367), has been analysed, the more crystalline portion being used.

SiO_2 .	CO_2 .	SO_3 .	CaO .	H_2O .	Al_2O_3, Fe_2O_3 .	Total.
8.95	8.25	12.60	27.30	43.70	0.30	101.10

This gives the formula $2CaO, 2(SiO_2, CO_2) + CaO, SO_3 + 16H_2O$, there being here slightly less silica, and slightly more carbonic anhydride and water than in the Swedish mineral. Dilute hydrochloric acid easily decomposes it, and water dissolves out traces of calcium sulphate. There is practically no loss at 100° . Under the microscope, the mineral appears homogeneous, and to be monosymmetric; it is to be considered as a definite species.

L. J. S.

Pickeringite from New South Wales. By GEORGE W. CARD (*Records Geol. Survey, N.S.W.*, 1896, 5, 6—14).—Pickeringite, as aggregates of delicate silky fibres, gave analysis I (by J. C. H. Mingaye) for material from Capertee, and II (by White) for material from the Shoalhaven district.

	Al_2O_3 .	MgO .	K_2O .	Na_2O .	SO_3 .	Insol.	Water [diff.].
I.	7.14	9.03	0.32	0.53	35.68	1.51	[45.79]
II.	10.91	4.68	1.06	trace	38.14	1.74	[42.37]

In II, the percentage of magnesia is normal, but in I it is unusually high (compare this vol., ii, 251). It seems likely that many of the magnesium alums, which have been described under various names, are not homogeneous.

Various minerals and rocks from New South Wales are shortly described in the paper.

L. J. S.

A Blue Mineral, supposed to be Ultramarine, from New Mexico. By R. L. PACKARD (*Proc. U.S. National Museum*, 1895, 17, 19—20).—A blue, earthy mineral, which, when first found, was supposed to be ultramarine, occurs as irregular veins in the limestone carrying the silver ore at Chloride Flat, near Silver City, New Mexico. The material, after being purified as far as possible by

hydrochloric acid and sodium carbonate solution, gave the following results on analysis.

Ignition.	SiO ₂ .	MgO.	FeO.	Al ₂ O ₃ .	K ₂ O.	Na ₂ O.	Total.
6.47	62.43	28.53	0.99	0.25	0.14	0.16	98.97

Chemically it is, therefore, like talc, but it differs from the latter in physical properties.

L. J. S.

Synthesis of Topaz. By ALFRED REICH (*Monatsh.*, 1896, 17, 149—171).—The contradictory results obtained by Daubrée and St. Claire Deville have led the author to again attempt the preparation of fluorine compounds by the action of silicon fluoride on aluminium silicate.

Amorphous aluminium silicate, having approximately the composition Al₂SiO₅, was obtained by adding aluminium sulphate solution to a solution of sodium silicate and caustic soda, the precipitate being subsequently washed by decantation and dialysis; this, after calcination, was heated to bright redness in a current of carefully dried silicon fluoride. The silicate increased in weight by 42.4—43.1 per cent., and the product consisted of indefinite, doubly refracting, seemingly rhombic crystals, which gave on analysis, in parts per cent., SiO₂, 42.24—42.46; Al₂O₃, 44.54—45.17, and F₂, 22.06.

A crystalline aluminium silicate, made by a modification of Frémy and Feil's process (*Abstr.*, 1878, 203), consisted of a mixture of corundum with andalusite or sillimanite; the various preparations made contained in parts per cent., SiO₂, 5—24; and Al₂O₃, 75—95, but all, when heated in silicon fluoride, increased by 33—38 per cent. in weight, yielding products, which gave on analysis, SiO₂, 31.70—33.04; Al₂O₃, 55.01—57.03; and F₂, 18.17—20.09, or, approximately, Al₂SiF₂O₄. The numbers are so nearly identical with those given by topaz that the substance must be considered as artificial topaz. The few crystallographic measurements possible with the artificial crystals also agree very closely with those of the mineral. On strongly heating the artificial crystals, a product of the percentage composition SiO₂, 29.56, and Al₂O₃, 67.95, results; these numbers are practically identical with those given by the product of heating natural topaz. Silicon fluoride cannot be the only substance driven off by heat, aluminium fluoride or fluorine must also be volatilised.

The author has not succeeded in obtaining concordant results with Jannasch's method (*Abstr.*, 1895, ii, 460) of analysing silicates containing fluorine, and recommends the following process. A mixture of 4—6 parts of sodium hydroxide with one of the silicate is fused in a silver crucible for 10—15 minutes; the product is then dissolved in water and precipitated by carbonic anhydride. The liquid is evaporated to a small bulk with ammonium carbonate, and three or four successive quantities of ammonium carbonate added and evaporated off. Warm water is then added, and the precipitate filtered on a platinum funnel and washed with ammonium carbonate solution; the precipitate contains all the alumina and silica, and a little silver, which are separated, and the former two constituents estimated in

the usual way. The filtrate is evaporated to drive off ammonium carbonate, acidified with acetic acid, rendered alkaline with lime water, evaporated to dryness, the residue taken up with water, and the solution filtered. The precipitate is lightly calcined and treated with dilute acetic acid; the calcium fluoride is weighed as such, then treated with sulphuric acid, and weighed as calcium sulphate as a control.

W. J. P.

[**Phillipsite from Wingendorf, Prussian Silesia.**] By P. KRUSCH (*Jahrb. k. Preuss. Geol. Landesanst. and Bergakad.*, 1895, **15**, (1894), 312—314).—In a description (p. 279—324) of the basalts occurring between Neisse and the River Queiss, Prussian Silesia, an analysis (by Klüss) is given of phillipsite from the basalt of Wingendorf, near Lauban. The rock here is especially rich in zeolites; phillipsite occurs as water-clear, twinned crystals.

Al_2O_3 .	CaO .	K_2O .	Na_2O .	H_2O (at 100°).	H_2O (at 200°).	H_2O (on ignition).	SiO_2 [diff.]
19.92	4.74	6.34	1.72	3.86	6.44	6.37	50.61

L. J. S.

Felspars of Igneous Rocks. By FERDINAND FOUQUÉ (*Zeits. Kryst. Min.*, 1896, **26**, 300—316; from *Bull. Soc. fran. Min.*, 1894, **17**, 283—611).—Optical and chemical determinations, both made on the same material, are given of numerous felspars from various rocks; the former include the extinctions in sections perpendicular to *a* and *c*, and on *c*(001) and *b*(010), the optic axial angle, the indices of refraction, &c. The following analyses of homogeneous material, separated by means of methylenic iodide, are given: I, anorthite from Etna; II—IV, labradorite-bytownite from the Azores; V, do. from Besseyre, Haute-Loire; VI—VIII, labradorite from the Azores; IX, andesine from Chenavary, Ardèche; X—XI, do. from Arcuentu, Sardinia; XII, oligoclase-andesine from Alagnon, Haute-Loire;

	SiO_2 .	Al_2O_3 .	CaO .	Na_2O .	K_2O .	MgO .	Fe_2O_3 .	Total.	Sp. gr.
I...	44.1	37.8	18.6	0.9	—	—	trace	100.4	2.748
II...	53.4	29.4	12.5	4.8	0.2	—	—	100.3	2.710
III...	54.2	30.3	11.8	3.9	0.2	—	—	100.4	2.705
IV...	53.3	30.1	11.4	5.1	0.1	0.1	trace	100.1	2.705
V...	54.5	29.8	11.4	4.5	0.3	—	—	100.5	2.698
VI...	55.4	29.4	9.7	5.7	—	0.2	0.5	100.9	2.695
VII...	55.9	29.3	9.7	5.0	0.3	—	—	100.2	2.698
VIII...	54.9	29.3	10.25	5.35	0.07	0.06	0.6	100.53	2.696
IX...	58.65	26.50	8.41	6.09	0.37	—	—	100.02	{ 2.662— 2.685
X...	62.65	24.19	6.28	6.48	1.24	—	—	100.74	
XI...	63.80	23.43	6.26	5.58	1.44	—	—	100.51	—
XII...	62.4	22.8	7.00	8.4	0.5	—	—	101.1	2.642
XIII...	64.32	23.05	3.90	8.50	0.54	—	—	100.31	2.642
XIV...	68.2	19.0	—	13.5	—	—	—	100.7	2.624
XV...	67.9	19.4	2.4	10.9	0.3	—	—	100.9	2.592
XVI...	67.7	19.7	0.7	11.1	1.7	—	—	100.9	2.597
XVII...	67.8	20.0	0.6	10.5	1.3	—	—	100.2	2.608
XVIII...	67.67	19.45	0.47	9.21	3.95	—	—	100.75	2.572
XIX...	68.3	19.5	trace	7.1	5.7	—	—	100.6	2.585
XX...	66.9	19.8	1.3	7.6	4.5	—	—	100.1	2.567
XXI...	68.0	20.1	0.6	10.1	1.2	—	—	100.0	—

XIII, oligoclase from Mexico?; XIV, albite from Modane, Savoy; XV, albite from Albepeyre, Haute-Loire; XVI—XVIII, anorthoclase from the Azores; XIX, do. from Sardinia; XX, do. from Mont Dore; XXI, do. from Liberté, Haute-Loire.

The author is led to the conclusion that the rock-forming anorthic feldspars are represented by the following types of definite composition, between which there are no intermediate members, but which may intergrow with one another; this is opposed to Tschermak's theory of a mixed series. Several of these types usually occur together in the same rock, the later ones being the more acid.

	Sp. gr.	SiO ₂ per cent.	2V.	Optical sign.	Extinction on		β_{Na}
					c(001).	l(010).	
Anorthite.....	2.745	44	77° 30'	—	—36° 30'	—41° 30'	1.582
Bytownite.....	2.725	—	—	—	—	—	—
Labradorite-bytownite.	2.705	54	77	+	—11	—25	1.563
Labradorite.....	2.696	55	77	+	— 5 30	—20	1.558
Andesine.....	2.675	58	88	+	— 2 30	—10	1.553
Andesine-oligoclase....	2.654	62	86	—	— 2	— 4	—
Oligoclase.....	2.645	64	88	—	+ 2	+ 8	1.542
Oligoclase-albite.....	2.640	65	88 30	+	+ 2 30	+10 30	—
Albite.....	2.610	68	77	+	+ 4	+19 30	1.534
Anorthoclase.....	2.580	68	45	—	+ 2	+ 9	1.528
Microcline-anorthoclase	2.570	—	60	—	—	—	—
Microcline.....	2.560	65.5	88	—	+15 30	+ 5 30	1.526

The following analyses are also given: I, yellow-brown hornblende from biotite-hornblende-andesite from Lioran; II, biotite from biotite-obsidian from the Plomb du Cantal.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MgO.	CaO.	Na ₂ O.	K ₂ O.	Total.
I.	41.3	15.6	11.5	3.2	13.5	13.1	1.4	0.3	99.9
II.	43.4	20.4	9.1	—	17.1	1.7	0.2	8.6	100.5

L. J. S.

Mica-syenite from Rothschnberg, Saxony. By J. M. C. HENDERSON (*Zeits. deutsch. geol. Ges.*, 1895, **47**, 534—547).—A dyke rock containing orthoclase, plagioclase, biotite, muscovite, quartz, magnetite, apatite, calcite, and pyrites from Rothschnberg, near Deutschenbora, in the Kingdom of Saxony, gave analysis I; the structure is panidiomorphic-granular, so that the rock is called a mica-syenite rather than a lamprophyre. Analysis II is of the felspar of sp. gr. 2.62—2.63; although apparently fresh, it is kaolinised, as is seen under the microscope and by the water in the analysis.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	CaO.	MgO.	K ₂ O.	Na ₂ O.	H ₂ O.	CO ₂ .	S.	Total.
I.	57.63	16.47	5.37	5.25	4.44	3.12	5.15	0.45	2.14	0.95	100.97
II.	66.67	16.81	0.97	2.06	0.54	4.82	5.89	1.80	0.25	—	99.81

L. J. S.

[Analyses of Sericite, Augite, and Waters from Bohemia.] By J. E. HIBSCH (*Tsch. Min. Mitth.*, 1895, **15**, 201—290).—In a paper explanatory of the geological map of the Bohemian Mittelgebirge are given several analyses of rocks, together with the following of minerals and waters. I is the mean of two analyses of sericite from a sericite-albite-gneiss, near Tetschen. II (by R. Pfohl) is of augite from a leucite-tephrite containing nepheline from Falkenberg; sp. gr., 3.37.

	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	CaO.	MgO.	K ₂ O.
I.	47.85	—	35.86	3.12	—	0.55	0.25	8.56
II.	45.67	0.62	9.04	7.46	2.00	21.78	12.09	0.56
			Na ₂ O.	H ₂ O.	Total.			
			I. 0.54	0.51	101.24			
			II. 1.25	0.31	100.78			

Water from a spring near Liebwerd, east of Tetschen, gave III in 100,000 parts; from a spring near Gomplitz, IV; both analyses by F. Ullik.

	CaO.	MgO.	K ₂ O.	Na ₂ O.	Al ₂ O ₃ , Fe ₂ O ₃ .	Cl.	SO ₃ .
III.	5.05	1.28	0.37	2.03	0.18	0.64	0.82
IV.	14.67	2.33	0.28	0.93	0.26	0.71	0.21
	SiO ₂ .	NH ₃ .	N ₂ O ₅ .	Reduced KMnO ₄ .	CO ₂ .		
III.	4.50	trace	trace	0.12	6.35		
IV.	1.65	trace	trace	0.27	19.9		

L. J. S.

Serpentine after Amphibolite. By JOHN B. JAQUET (*Records Geol. Survey, N.S.W.*, 1896, **5**, 18—25).—A description is given of the intrusive and metamorphic rocks of Berthong, Co. Bland, N.S.W.; the ultrabasic rocks include an amphibolite, which consists of hornblende, with a little magnetite and, rarely, chromite; this has been altered in places to serpentine, as is seen by the intimate association of the two rocks, and by the microscopical examination. The serpentine, which contains magnetite and chromite, gave analysis I, and the adjacent amphibolite, analysis II (by J. C. H. Mingaye). The alteration has been accompanied by a removal of alumina and silica.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	MnO.	Cr ₂ O ₃ .	(Co,Ni)O.	CaO.	MgO.
I.	40.80	2.54	6.20	0.48	trace	0.29	0.25	—	32.82
II.	49.30	10.42	2.20	3.83	—	trace	trace	11.82	19.36
					H ₂ O	H ₂ O			
		Na ₂ O.	K ₂ O.	(at 110°).	(combined).	Total.	Sp. gr.		
I.		0.27	—	2.87	10.11	99.63	2.52		
II.		1.14	0.50	0.26	0.79	99.62	3.00		

L. J. S.

A Mineral Spring at Bungonia. By J. MILNE CURRAN (*Jour. and Proc. Roy. Soc., N.S.W.*, 1894, **28**, 54—59).—Analysis of the water of a spring at Bungonia, New South Wales, gave the following results in grains per gallon: SiO₂, 1.47; FeO, 0.19; CaO, 35.00;

MgO, 5.18; Na₂O, 5.53; K₂O, 4.27; Cl, 5.88; SO₃, 1.16; CO₂ (combined), 34.86; H₂O (combined), 10.75 = total solids, 104.29 (less oxygen for Cl = 103.04).

Carbonic anhydride is given off by the water with deposition of a tufa, either porous or compact and crystalline, which gave on analysis,

Insol. in HCl.						
Organic matter.	SiO ₂ .	Fe ₂ O ₃ , Al ₂ O ₃ .	CaCO ₃ .	MgCO ₃ .	Na ₂ CO ₃ , K ₂ CO ₃ .	
7.9	3.6	0.9	79.4	2.3	1.0	
H ₂ O (combined).		Total.	Sp. gr.			
4.9		100.0	2.58			

L. J. S.

The new hot Springs of Ædipsos and Gialtra. By ANASTASIUS K. DAMBERGIS (*Tsch. Min. Mitth.*, 1896, **15**, 385—393).—During the Locris (Greece) earthquakes of April, 1894, more than one hundred new hot springs were started at Ædipsos and Gialtra, whilst the old ones were affected as regards quantity of water and temperature, there being an increase in most cases. The new springs are of the same nature as the old ones, the temperature varying from 32° to 82°; determinations of the total solids, chlorine, and carbonic anhydride (in grams per litre) are given for several springs, the extremes of which are given below, and compared with the extremes obtained for the old springs in 1889 (*Abstr.*, 1892, i, 418) and 1894. The vapour of many of the new springs smells of hydrogen sulphide, as does that of the old springs; only in one case was there a determinable amount of hydrogen sulphide, however, namely, 21.7 c.c. in a litre of water.

	Total solids.	Chlorine.	Carbonic anhydride.
New springs of Ædipsos ...	19.188—37.327	12.699—21.300	0.601—0.698
" " Gialtra	37.505—39.149	18.083—19.380	0.656—0.692
Old springs of Ædipsos (1889)	22.958—33.355	13.119—19.230	0.561—0.673
" " " (May, 1894)	29.580—39.707	15.655—19.241	—

L. J. S.

Physiological Chemistry.

Influence of Fat and Starch on Metabolism. By A. WICKE and HUGO WEISKE (*Zeit. physiol. Chem.*, 1896, **22**, 137—152).—In this second series of experiments, the same two sheep were employed as on a previous occasion (*Abstr.*, 1895, ii, 516).

The daily diet was 800 grams of air-dried hay and 200 grams of linseed; this was continued for eight days, the urine and fæces being

examined every day. During a second period, in addition, 146.4 grams of starch, and during a third period an equivalent quantity (in heat value, 60 grams) of olive oil was given.

In both cases the amount of nitrogen excreted was lessened, but this proteid sparing action was much more marked in the starch than in the fat periods.

W. D. H.

Nutritive value of Gland-peptone. By ALEXANDER ELLINGER (*Zeit. Biol.*, 1896, **33**, 190—218).—Most previous observers have stated that various commercial preparations of "peptone" are of equal nutritive value to that of native proteid. Voit, however (*Hermann's Handbuch*, **6**, 121), did not find this to be the case in dogs with the form of peptone he used. The different kinds of so-called peptone used account in some degree for this difference in result. The present research was also carried out on dogs. The peptone chiefly investigated was gland-peptone, an antipeptone of low molecular weight, formed by the auto-digestion of the pancreas. This, in contrast to albumin and Witte's peptone (chiefly albumoses), does not maintain nitrogenous equilibrium; the animal loses weight, and gets ill. It is suggested that the intestinal epithelium is not able to reconvert such large doses of peptone of low molecular weight into albumin, but that some is absorbed as such, and produces harmful results.

W. D. H.

Absorption of Proteids in the Small Intestine. By GEORG FRIEDLÄNDER (*Zeit. Biol.*, 1896, **33**, 264—287).—Physiologists have lately arrived at the conclusion that mere physical reasons will not explain absorption in the alimentary canal; and in special connection with proteids, that their change into peptone before absorption is not absolutely necessary. Proteids, when in excess, are absorbed unchanged, and appear in the urine. They usually undergo some change, either before or during their passage through the mucous membrane, so that, even if they are not peptonised, they cannot be recognised in their original form afterwards. In the present research, known quantities of proteid in solution were injected into isolated loops of intestine a considerable distance from the pylorus, and their contents were subsequently examined, allowance being made for any proteid matter from the intestinal wall. In the following table the mean percentage of proteid absorbed is given for a number of different proteids used in the experiments.

Casein	0
Acid-myosin	0
Acid-albumin	0
Egg-albumin and serum albumin	21
Alkali-albumin	69
Albumoses	72
Peptone	91

W. D. H.

Molybdic acid as a Microscopic Reagent. By L. HEINE (*Zeit. physiol. Chem.*, 1896, **22**, 132—136).—Lilienfeld and Monti's (*Abstr.*,

1893, ii, 135) method for microchemically localising phosphorus is not regarded as trustworthy. The reduction, either by pyrogallol or by stannous chloride, as some recommend, occurs in structures and substances which are free from phosphorus. W. D. H.

Thymin from the Spermatozoa of the Sturgeon. By ALBRECHT C. L. M. L. KOSSEL (*Zeit. physiol. Chem.*, 1896, 22, 188—190).—Thymin, previously prepared from the nuclei of the thymus, is also obtainable as a decomposition product of the nucleic acid of the spermatozoa of the sturgeon. W. D. H.

Hæmatoporphyrinuria. By BAREND J. STOKVIS (*J. Pathol. and Bacteriol.*, 1896, 4, 155).—The author previously considered that the hæmatoporphyrin in normal urine and in that of patients taking sulphonal, was due to the presence of blood in the alimentary canal (*Zeit. f. Med.*, 27, 1). Garrod and Hopkins (this vol., ii, 264) doubted this explanation, and it is now withdrawn, because the urine of rabbits contains the material when they are feeding on blood-free food, and living under conditions which exclude hæmorrhages. W. D. H.

Chemistry of Vegetable Physiology and Agriculture.

Proteïds and Carbohydrates of Green Leaves as Products of Assimilation. By W. SAPOSCHNIKOFF (*Bied. Centr.*, 1896, 25, 106—108; from *Bot. Centr.*, 1895, 62, 246; compare *Abstr.*, 1891, 763; *Bied. Centr.*, 1893, 70, and 1894, 775).—The results of experiments, in which cut leaves of *Vitis vinifera* and *V. labrusca* were kept in a nutritive solution and in distilled water respectively, showed that with plenty of nitrate and a moderate amount of light, there is an increased production of proteïds with lessened formation of carbohydrates, or the production of carbohydrates may be quite suppressed. Asparagine cannot serve as a source of nitrogen for producing proteïds in cut leaves.

In an atmosphere rich in carbonic anhydride, the production of carbohydrates is increased, even when light is unfavourable, but there is no increased production of proteïds.

When entire plants are kept in the dark, there is not only a migration of carbohydrates, but also, although to a less extent, of proteïds from the leaves.

The maximum accumulation of different substances in cut leaves, of which the stalks dipped in water or nutritive solutions, was as follows: Carbohydrates, in the two varieties of *Vitis* = 23—29 per cent.; sugar = 5·2 per cent.; starch = 8 per cent. of the dry matter. In leaves of *Rubus cæsius* and *fruticosus* the maximum for sugar was found to be between 6 and 7 per cent. N. H. J. M.

The Position of Arsenic in Plant Production. By JULIUS STOKLASA (*Bied. Centr.*, 1896, **25**, 353; from *Chem. Rep.*, 1896, 16).—A number of plants, 35 days' old, were treated with nutritive solutions containing (1) 0·019 gram of arsenious acid, (2) 0·023 gram and (3) 0·23 gram of arsenic acid. In solution (2) there was no poisoning; in solution (1) the plants were killed in 46 to 90 hours; in solution (3) in 24—42 days.

Further experiments with oats showed that arsenic acid cannot take the place of phosphoric acid, but that, in absence of phosphoric acid, it will induce increased production of organic substance up to the flowering period. N. H. J. M.

The Tannin of Fungi. By OTTO NAUMANN (*Bied. Centr.*, 1896, **25**, 353; from *Bot. Centr.*, 1896, **65**, 254, and *Inaug. Diss.*, Erlangen).—Fungi cannot produce tannin, but may take it up and utilise it as food when decomposed. Certain fungi do not absorb tannin, and are injured in presence of excessive amounts. *Polyporeæ* contained 0·034 to 0·400 per cent. of tannin; *Agaricaceæ*, 0·041 to 0·060 per cent. Parasites usually contained more tannin (0·180—0·400 per cent.). The relatively small amounts of tannin in fungi as compared with various plants confirms Hartig's view, that in fungi the tannin is chemically decomposed. N. H. J. M.

Nutrition and Formation of Substance in Sugar Beet in the Second Year of Growth. By FRIEDRICH STROHMER, H. BRIEM, and A. STIFT (*Bied. Centr.*, 1896, **25**, 170—172; compare *ibid.*, 1893, **22**, 473).—The experiments now recorded were made with entire roots instead of with half roots. The mineral and organic matters of a root are not sufficient for the production of leaves and stems, &c., so that application of nutritive matter is necessary, if it is not already present in the soil in an assimilable state. In the second year of growth, the newly produced substance of the whole plant shows a gradual decrease of non-nitrogenous extract, mainly due to a gradual decrease of this substance in the dry matter of the root. The dry matter of the developing plant, however, shows a gradual increase of crude fibre, nitrogen, and ash constituents. Mineral matter is taken up by the root in the first period of growth. The object of the nitrogen-free reserve substance seems chiefly to provide for the heat necessary for growth. Nitrogen is of most importance for the production and character of seed. Proteïds, as well as the nitrogen-free extract substances, seem to have the same physiological function in the life of plants as in animals. N. H. J. M.

The Nutritive Substances of Beetroot. By W. SCHNEIDEWIND and H. C. MÜLLER (*Bied. Centr.*, 1896, **25**, 315—326; from *J. Landw.*, 1896, **44**).—By cultivation and selection of beetroot for sugar, the amount of ash in the roots was often reduced to little more than half the average amounts given by Wolff, whilst the amount of ash in the leaves was not influenced. The amounts of ash and of nitrogen are in inverse proportion to the amount of sugar, the composition of the ash also being of importance. Potash manures and sodium nitrate

increase the percentage amounts of potassium and sodium respectively in roots and leaves, and also the total amounts. Kainite increases the taking up of potash but not of soda or magnesia. Manuring with lime gives rise to increased amounts of lime in the plants, but the lime is diminished by applications of potash and soda.

Manuring with kainite can increase assimilation of phosphoric acid, but without benefit as regards sugar production. A further effect of kainite is to increase assimilation of chlorine, which is mainly stored up in the leaves; this seems to be beneficial, owing to the plant acids being diminished as the chlorine increases.

Late application of nitrogen is not recommended; luxuriance of leaves should be obtained as early as possible. Sodium nitrate acts, however, more quickly than potassium nitrate (owing to its being more readily soluble and diffusible), and may be applied as an early top dressing with greater effect than before sowing.

The mutual influence of single nutritive substances has an important rôle in plant life, and should be investigated under different conditions of soil, &c.

N. H. J. M.

Amount of Acid in Rhubarb Stems and in Rhubarb Wine.

By R. OTTO (*Bied. Centr.*, 1896, **25**, 128—129; from *Landw. Jahrb.*, 1895, **24**, 273).—The microchemical examination of rhubarb stems showed the presence of calcium oxalate, in some varieties in large quantities. The following amounts of free oxalic acid were found in different varieties of rhubarb stems at the flowering period (17 and 18 May):—Prince of Wales, 0.1913; Queen Victoria, 0.1943; *Rheum nepalense*, 0.2153; *R. paragon*, 0.2230; and *R. nutans*, 0.3161 per cent. On the 4th June, the following percentages were found:—*R. crispum*, 0.2080; *R. leucorhizum*, 0.2220; *R. palmatum*, 0.2580; *R. nepalense*, 0.2710.

Rhubarb wine, as prepared from the stems, had the following composition (grams per 100 c.c.).

Extract.	Alcohol.	Acid.	Glycerol.	Oxalic acid.	Ash.	Sp. gr. at 15°.
2.412	3.94	0.748	0.547	0.0670	0.397	1.0005

The oxalic acid is very readily removed by adding precipitated calcium carbonate (in this case 0.72 gram per litre).

N. H. J. M.

Identification and Isolation of Acids contained in Plants.

By LÉON LINDET (*Compt. rend.*, 1896, **122**, 1135—1137).—Methylic alcohol of 95° G.L. dissolves only 0.3 per cent. of quinine hydrogen citrate and 3.3 per cent. of the normal salt, but it dissolves 8.2 per cent. of quinine hydrogen malate and 8.0 per cent. of the normal salt. It also dissolves 9.2 per cent. of quinine hydrogen oxalate, and 8.2 per cent. of the normal oxalate.

A methylic alcohol solution of cinchonine, precipitates malic acid in the same circumstances as quinine precipitates citric acid, the solubility of cinchonine hydrogen malate being only 2.5 per cent. All the other salts of cinchonine with vegetable acids are much more soluble. Citric acid and other acids, however, tend to prevent the precipitation of malic acid by cinchonine.

The vegetable juice is evaporated to dryness in a vacuum, and the residue treated with methylic alcohol. Tartaric acid and potassium hydrogen tartrate, if present, must be removed. The methylic alcohol solution of acids is diluted until it contains about 2·5 per cent. of acid, and solid quinine is added in successive small portions, with continual agitation, until the whole liquid changes to a mass of crystals. The proportion of quinine should not exceed 160—170 parts for every 100 parts of citric acid supposed to be present. After 24 hours the liquid is filtered, and the filtrate is treated in the same way. After removal of the quinine hydrogen citrate, if citric acid is present, cinchonine is added in the same way, in order to precipitate the malic acid. The acids are afterwards readily liberated from the quinine or cinchonine salt. C. H. B.

Presence of a Glucoside of Methylic Salicylate in *Monotropa Hypopithys*, and a Ferment which hydrolyses it. By EMILE E. BOURQUELOT (*Compt. rend.*, 1896, **122**, 1002—1004).—When the stalks of *Monotropa hypopithys* are added to boiling alcohol of 95°, the liquid dissolves a glucoside, which can be isolated in the usual way, and which is probably identical with gaultherin. It is precipitated by ether from its alcoholic solution; its aqueous solution is lævogyrate. If the aqueous solution is boiled with dilute sulphuric acid, it yields methylic salicylate. *Spiræa Ulmaria* and *S. Filipendula*, *Gaultheria procumbens*, *Polygala Senega* and *Betula lenta* contain a ferment which liberates methylic salicylate from the glucoside; it remains in the insoluble matter when parts of these plants are completely exhausted with alcohol of 90°. *Azalea* petals and the root of *Spiræa salicifolia* contain the same ferment, but it is not present in the bark of *Betula alba*. That it is a specific ferment is shown by the fact that it does not affect other glucosides, whilst the glucoside yielding methylic salicylate is not affected by other ferments. It follows that plants which yield methylic salicylate, contain this substance in the form of a glucoside, from which it is liberated by the action of a specific ferment present in the same organs of the plant.

Schneegans has given the name *betulase* to the ferment obtained by Procter from the bark of *Betula lenta*, but the author regards as preferable the name *gaultherase*, which recalls the substance on which the ferment acts (compare Abstr., 1895, ii, 177). C. H. B.

Nitrogen Compounds of Malt and Beer Worts. By E. EHRLICH (*Bied. Centr.*, 1896, **25**, 333—337; from *Bierbrauer*, 1895, 145, 161, and 177; compare Abstr., 1895, ii, 181).—Experiments on the separation of the nitrogenous compounds, showed that lead acetate precipitates more than copper hydroxide, and that phosphotungstic acid precipitates more than lead acetate and tannin together. Tannin precipitates more so-called peptone nitrogen from the filtrate from the albumin precipitate than from the original solutions containing albumin. The method adopted was to precipitate first with lead acetate, and to treat the filtrate (after removal of the lead) with tannin.

In the germination of barley, the proteids become peptonised, the more the nitrogenous compounds are dissolved the further the develop-

ment proceeds (within the ordinary limits of malt production). The most favourable temperature for peptonisation is 50°. Of nitrogen compounds, proteids have the least nutritive value for yeast.

N. H. J. M.

Composition of the Flower Dust of Sugar Beet. By A. STIFT (*Bied. Centr.*, 1896, **25**, 180—182; from *Oest.-Ung. Zeit. f. Zuckerind. und Landw.*, 1895, **24**, 783—788).—The substance, freed as well as possible from foreign matter, still contained 7.83 per cent. of sand. The following percentage results are calculated on the substance free from sand.

Water.	Protein.	N. as NH ₃ .	Other nitrogenous matter.	Fat.	Starch and dextrin.	Pentosans.	Other N.-free substances.
9.78	15.25	0.41	2.50	3.18	0.80	11.06	23.70
Crude fibre.			Ash.	K ₂ O (in ash).	P ₂ O ₅ (in ash).		
25.45			8.28	5.80	6.65		

The nitrogen as ammonia is probably chiefly in the form of trimethylamine. The substance contains free oxalic acid. Besides cane sugar, the substance contains a second sugar, which reduces Fehling's solution.

N. H. J. M.

Nitrates in Potable Waters. By J. J. THÉOPHILE SCHLOESING (*Compt. rend.*, 1896, **122**, 1030—1038; compare *Abstr.*, 1895, ii, 286).—The author has estimated at various times in the course of 14 months the quantities of calcium and nitric acid in the waters of the Vanne, the Dhuis, and the Avre. In the case of the Vanne and the Dhuis, the variations in the proportions of calcium and nitric acid respectively are in no constant relation to one another, and are not influenced in any definite manner by the volume of water passing down the streams. It would seem, therefore, that the variations are due to geological, rather than to climatic causes. In the case of the Avre, on the other hand, the quantity of calcium and nitric acid present decreases generally when the volume of water in the stream increases, and *vice versa*. Moreover, the proportions of calcium and nitric acid vary, as a rule, in the same direction, and it follows that the water of the Avre is a mixture of true spring water with either surface water or water that has percolated rapidly through soil and rocks in which no formation of nitrates is taking place.

C. H. B.

Analytical Chemistry.

Estimation of Water in Superphosphates. By LEONARD DE LONINGH (*Ned. Tydschr. Pharm.*, &c., 1896, 190—191).—In order to prevent volatilisation of free acid during ignition, in estimating the total amount of water in superphosphates, 5 grams of the sample is mixed with about 1 gram of freshly ignited magnesia, and the

whole is then exposed to a dull red heat. If the sample contains ammonium sulphate, it must be remembered that although the sulphuric acid is completely retained by the magnesia, the ammonia volatilises, and must be allowed for.

This method cannot, of course, be employed if organic substances and nitrates are present.

L. DE K.

Use of Aldehydes containing Ozone for the Detection of extremely small quantities of Iodine in the presence of Chlorine and Bromine. By EUGEN LUDWIG (*Ber.*, 1896, 29, 1454—1456).—Aldehydes that have been distilled in a current of air liberate iodine from a solution of an iodide, but have no effect on bromides or chlorides. They do not possess this property after distillation in a current of carbonic anhydride. A very sensitive reagent for iodides can be obtained by leaving 1 c.c. of acetaldehyde for one hour in a 2-litre flask; or by heating benzaldehyde to boiling in a test tube, and making 10 drops of it into an emulsion with 10 c.c. of water. A very small quantity of the reagent is added to the solution of the iodide, and the solution is then shaken with the smallest possible quantity of colourless carbon bisulphide; with 1 part of iodine in 50,000 originally present, a perceptible pink tinge is obtained.

If a solution of potassium iodide is boiled with paraldehyde while a current of air is passed through the mixture, all the iodine is driven over, and potassium acetate remains in the solution.

Since aldehydes can hold ozone in solution for a comparatively long time without becoming oxidised, the author thinks they must form peroxides with it, possibly analogous to the compounds they form with sodium hydrogen sulphite.

C. F. B.

Estimation of Sulphur in Inorganic Sulphides. By PAUL JANNASCH and H. LEHNERT (*Zeit. anorg. Chem.*, 1896, 12, 129—131; compare *Abstr.*, 1894, ii, 330).—About 0.5—0.75 gram of natural cinnabar is heated in a current of dry oxygen in the apparatus already described by the author, and the evolved sulphurous anhydride collected in a solution of hydrogen peroxide. When the combustion is completed, and the mercury distilled, the apparatus is allowed to cool in a current of gas, and the liquid in the absorption tubes mixed. The sublimed mercury is washed out with hot nitric acid. The solution is evaporated to a small volume, treated with aqua regia to dissolve any mercury remaining, and then evaporated to dryness. The residue is dissolved in water and dilute nitric acid, the sulphuric acid estimated by precipitation with barium chloride, and the mercury weighed as sulphide. When the cinnabar is contaminated with silica, iron, or carbon, this method is especially convenient, as a clear solution is at once obtained.

Commercial crystalline tin sulphide is analysed in a similar manner to the above. The combustion is carried on until the tin dioxide remains unaltered; this is then weighed in the combustion tube.

E. C. R.

Drown's Method of estimating Sulphur in Pig Iron. By GEORGE AUCHY (*J. Amer. Chem. Soc.*, 1896, **18**, 406—411).—The author has slightly modified this process, and operates as follows. 3.4335 grams of the pig iron drillings is introduced into a 16-ounce flask connected with a Troilius' bulb containing 6 c.c. of a 1 per cent. solution of potassium permanganate and 6 c.c. of 20 per cent. aqueous potash. The iron is now dissolved in hot dilute hydrochloric acid, and finally air is drawn through the apparatus by means of a filter pump.

The contents of the bulb are now washed into a small beaker. The iron solution is filtered, and, after being washed, the insoluble residue is rinsed into an evaporating dish. After evaporating to dryness, 30 c.c. of nitrohydrochloric acid is added, and then again evaporated off. The mass is now heated with 10 c.c. of dilute hydrochloric acid, which is then filtered and added to the alkaline permanganate solution, which, of course, contains the greater part of the sulphur. To better reduce the excess of permanganate, a sufficiency of oxalic acid is added, and the liquid is boiled. The sulphuric acid is then precipitated in the usual way with barium chloride. Traces of silica in the potash, or a little undecomposed oxalic acid, do not in the least interfere.

L. DE K.

Estimation of Pyrrhotite in Pyrites. By EDWIN F. CONE (*J. Amer. Chem. Soc.*, 1896, **18**, 404—407).—The author advises examining pyrites for the presence of pyrrhotite (Fe_7S_8), as this is of inferior value to makers of sulphuric acid.

The ground sample is passed through a 60-mesh sieve and 13.74 grams is then weighed and spread out upon a good-sized sheet of glazed paper. By means of a magnet, the pyrrhotite is removed, and by first stroking suddenly the top of the magnet, the mechanically admixed pyrites are separated, and the magnetic substance is then removed by means of the armature and a brush. The process is repeated five or six times, and the magnetic portion is then finely powdered and oxidised by means of nitric and bromohydrochloric acids. From the weight of the barium sulphate, the amount of Fe_7S_8 is calculated.

L. DE K.

New Safety Distillation Tube for Nitrogen Estimations. By CYRIL G. HOPKINS (*J. Amer. Chem. Soc.*, 1896, **18**, 227—228).—This modification of Reitmeir's distillation tube for use in the Kjeldahl process differs from the usual pattern in so far that not only the tube which passes into the distillation flask, but also the tube within the bulb has an opening on the side, and a jet at the end. The vapour passes in through the side openings, and whatever condenses in the top part of the bent tube passes back into the flask through the jets.

All danger of alkaline liquid being mechanically forced into the distillate is thereby avoided.

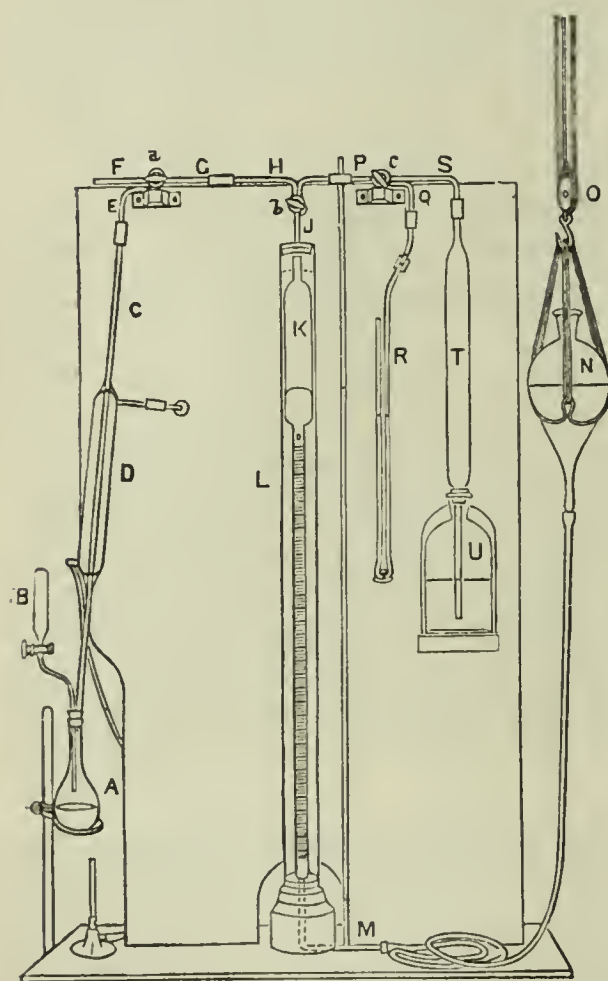
L. DE K.

Modifications of Pemberton's Volumetric Method of estimating Phosphoric acid in Fertilisers. By F. P. VEITCH (*J. Amer.*

Chem. Soc., 1896, **18**, 389—396).—The author has investigated the various modifications of Pemberton's volumetric molybdate process, and tabulated the results. The final conclusions are: (1) That the best results are obtained by adding 10 per cent. extra nitric acid to the official molybdate solution, and allowing this to act for half an hour at 40—50°. (2) That, although addition of tartaric acid gives good results, it possesses no advantage, and only retards the precipitation of the phosphoric acid. L. DE K.

[**Analysis of Silicates containing Fluorine.**] By ALFRED REICH (*Monatsh.*, 1896, **17**, 149—171).—See this vol., ii, 531.

Estimation of Carbon in Steel. By ANDREW A. BLAIR (*J. Amer. Chem. Soc.*, 1896, **18**, 223—227).—The 400-c.c. pipette T is connected by means of the stopcocks *b* and *c* with the burette K, and by lowering the mercury reservoir the pipette is filled with aqueous potash of sp. gr. 1.27. The stopcock *c* is closed, the burette



filled with mercury, and *b* then closed. One gram of the steel drillings is introduced into the 200-c.c. flask A, which is then attached to the apparatus. The water is started through the condenser D, and the flask is connected with the burette by means of the stopcock *a*. 15 c.c. of a saturated solution of pure copper sulphate is poured through the funnel tube B into the flask. After it has acted long enough to form a superficial deposit of copper on the metal, 15 c.c. of a 50 per cent. solution of chromic acid and 135 c.c. of the following mixture is added: 35 c.c. of chromic acid solution, 115 c.c. of water, 750 c.c. of sulphuric acid, and 315 c.c. of phosphoric acid of 1.4 sp. gr. The solution in the flask is now raised to the boiling point, and, by means of the reservoir, the mercury in the burette and

the tube M is kept nearly level. The water condensed in the tube C drops back into the flask, and keeps the liquid of the same density, while the cooled gases pass into the burette.

The flask is now allowed to cool for 5 minutes, and is then filled through the tube B with water to the stopcock *a*, thus forcing all the gas into the burette. The cock is then closed, and the burette is connected by means of the stopcocks *b* and *c* with the manometer R containing water; the levels are adjusted accurately, and the reading of the burette is taken. By means of the stopcock *c* the burette is

connected with the pipette T, and by raising and lowering the reservoir N the gas is passed several times backwards and forwards to cause the alkali to absorb all the carbonic anhydride. Another reading is then made, care being taken that the burette contains a few drops of water, and the difference between the two readings represents the volume of the carbonic anhydride, which is then corrected for pressure, temperature, and moisture. The volume of the gas so obtained, multiplied by 0.0019663, gives the weight.

L. DE K.

Rapid and Exact Estimation of Lime in Soils. By A. NANTIER (*Ann. Agron.*, 1896, 22, 245—246).—The soil (5 grams) is treated with 50 c.c. of acid (100 c.c. of acid = 5 grams of CaCO_3) in a cylindrical glass vessel, and heated rapidly to boiling for 4 or 5 seconds to expel the dissolved carbonic anhydride. Water (50 c.c.) and a few drops of litmus solution are added, and the liquid titrated. When saturated, the liquid becomes reddish-violet, and at the same time the clayey magma is instantly precipitated. The process is very accurate as well as rapid; two operators can easily make 20 determinations in an hour.

N. H. J. M.

Quantitative Analysis by Electrolysis. By MAX HEIDENREICH (*Ber.*, 1896, 29, 1585—1590).—The author has tested the methods given by Smith for the estimation of various metals by means of electrolysis. The only method, by means of which he has succeeded in getting good results, is that given for copper, whilst in the cases of iron, cadmium, silver, molybdenum, and uranium, the results were unsatisfactory. On the other hand, the separation of lead from mercury, and copper from zinc, in presence of nitric acid, and of silver from copper, silver from zinc, mercury from zinc, and mercury from nickel in presence of potassium cyanide all succeeded well. Silver cannot be separated from lead by the method described by Smith, nor copper from cadmium, although the latter separation can be effected in presence of sulphuric acid.

A. H.

Delicate Form of the Mercury Iodide Reaction. By PAUL JANNASCH (*Zeit. anorg. Chem.*, 1896, 12, 143—145).—The slightly acid solution of the mercury salt is treated with perfectly clean pieces of copper, and warmed in lukewarm water. The solution is then poured off, the copper washed with cold water, then turned out on to filter paper, and carefully pressed until dry. It is then transferred to a test tube, and the neck of the tube drawn out to a capillary. The copper is then heated until the sublimate has collected round the capillary. The bottom of the tube is cut off, and the upper part placed in a cylinder containing a small piece of iodine, when a deposit of red mercuric iodide is obtained. The tube can then be sealed at both ends and kept as a specimen. By this method 0.0005 gram of mercury chloride can be easily detected, but no certain result was obtained with 0.0001 gram. About 0.00001 gram of mercuric chloride can be detected if a copper strip, after treatment with the mercury solution and drying, is placed on a watch glass near to, but not touching, a small piece of iodine, and then covered with another glass for about

10 minutes. Rings of deposited mercuric iodide are formed on the copper, and these when examined under the microscope are seen to consist of dark red quadratic tablets or octahedra, which appear yellow when separated. E. C. R.

Separation of Mercury from other Metals by heating the Sulphides in a Current of Oxygen. By PAUL JANNASCH and H. LEHNERT (*Zeit. anorg. Chem.*, 1896, 12, 132—133).—The same apparatus is employed as for the analysis of sulphides, the three absorption tubes being filled with dilute nitric acid. The separation of mercury and tin is carried out as follows. The metals are precipitated as sulphides, and the precipitate dried at 90°. The precipitate is separated from the filter paper, and the filter paper first burned in the apparatus, the bulk of the precipitate is then added, and the mercury distilled off, whereby white tin oxide remains behind and is weighed in the combustion tube. The mercury is precipitated as sulphide. This method is applicable to the separation of mercury from nearly all organic and inorganic mixtures containing it.

E. C. R.

Separation of Manganese from Copper and Zinc, and of Copper from Zinc and Nickel. By PAUL JANNASCH (*Zeit. anorg. Chem.*, 1896, 12, 134—142; compare *Abstr.*, 1895, ii, 331).—*Separation of Manganese and Zinc.*—The metallic salts (0.4 gram) are dissolved in water (10—18 c.c.) containing a few drops of hydrochloric acid and mixed with acetic acid (15 c.c.). The mixture is then slowly added to a mixture of concentrated ammonia (40—50 c.c.) and 3 per cent. hydrogen peroxide (30—40 c.c.), and heated on the water bath for 10—15 minutes. The precipitate is washed with strong, then with dilute, ammonia, and finally with warm water. It is entirely free from zinc. The zinc is estimated in the filtrate by any convenient method.

Separation of Manganese and Copper.—The metallic salts (0.4 gram) are dissolved as above, and the solution gradually added to a mixture of ammonia (60 c.c.) and hydrogen peroxide (50—60 c.c.). The mixture is heated on the water bath for half an hour, filtered, and the precipitate washed with a hot solution of ammonium acetate in concentrated ammonia, and then with ammonia and water. The precipitate is entirely free from copper. The filtrate containing the copper is evaporated to dryness, heated on the air bath, and the copper precipitated either with sodium hydroxide or with sulphurous acid and ammonium thiocyanate.

The precipitate of copper sulphide obtained in an acid solution containing zinc by means of hydrogen sulphide always contains zinc. The author proceeds as follows. In the case of an alloy, about 1 gram is dissolved in nitric acid, the solution evaporated to dryness, and the residue dissolved in dilute nitric acid, and any tin oxide filtered off. The solution is again evaporated to dryness, and the residue dissolved in water and concentrated sulphuric acid (10 c.c.), diluted to 350 c.c., and the copper precipitated at 85—95° by hydrogen sulphide. The copper sulphide, which is quite free from zinc, is converted into oxide by heating in a current of oxygen. The filtrate

containing the zinc is evaporated to 100—150 c.c., and the zinc precipitated with sodium carbonate. Nickel and zinc are separated as follows. The two metals are precipitated together as carbonates, the precipitate dissolved in hydrochloric acid, evaporated to dryness, dissolved in water containing at most 10 drops of hydrochloric acid, and the solution gradually added to a warm solution of pure sodium hydroxide. The mixture is boiled, diluted with water, and the precipitated nickel separated by filtration.

The author discusses the advantages of the alkaline hydrogen peroxide method of separation as compared with the ordinary methods.

E. C. R.

Särnström's Method of estimating Manganese in Iron Ores. By C. T. MIXER and H. W. DuBOIS (*J. Amer. Chem. Soc.*, 1896, **18**, 385—389).—The process is based on the well-known fact that manganese is not precipitated from strongly acid solutions by sodium carbonate, whilst iron is readily thrown down.

The author finds that in the case of ores poor in manganese the process gives excellent results if care is taken to avoid excess of sodium carbonate. The use of the bicarbonate has no practical advantage. After the iron hydroxide has subsided, the liquid is at once warmed to 80°, and titrated with standard permanganate.

For ores rich in manganese, the method is untrustworthy.

L. DE K.

Volumetric Estimation of Manganese. By GEORGE C. STONE (*J. Amer. Chem. Soc.*, 1896, **18**, 228—229).—The author thinks that Volhard's method as modified by Auchy (this vol., ii, 339) is unnecessarily complicated, and states that the process gives very accurate results if used as follows.

The quantity of manganese should amount from 0.05—0.15 gram. The sample of iron is dissolved in a suitable acid, but care must be taken to thoroughly oxidise the iron by boiling with nitric acid, or hydrochloric acid and potassium chlorate. After cooling, the solution is mixed with a sufficiency of an emulsion of zinc oxide, and then made up to exactly 500 c.c. When the precipitate has subsided, 100 c.c. of the liquid is put into a basin, diluted to 200 c.c., heated to boiling, and rapidly titrated with standard permanganate while vigorously stirred.

L. DE K.

Separation of Metals in Alkaline Solution by means of Hydrogen Peroxide. XV. By PAUL JANNASCH and H. LEHNERT (*Zeit. anorg. Chem.*, 1896, **12**, 124—128).—*Separation of Arsenic and Cobalt.*—A solution of cobalt ammonium sulphate and arsenious acid in nitric acid (2 c.c.) and water (10 c.c.) is gradually added to a solution of pure sodium hydroxide (10 grams) in water (20—25 c.c.), mixed with 3 per cent. hydrogen peroxide (30 c.c.). The mixture is warmed for half an hour on the water bath, diluted with hot water to about 250 c.c., and the precipitate of cobalt hydrated peroxide filtered off, washed with hot water, dried, ignited, and weighed as cobalticobaltous oxide, then reduced to metallic cobalt, and again weighed. The filtrate containing the arsenic is acidified with con-

concentrated nitric acid, evaporated to a small volume, mixed with 2 grams of citric acid, and made strongly alkaline with ammonia, when no precipitate should be obtained even on standing. The arsenic is then precipitated with magnesium chloride, and the precipitate washed with dilute ammonia and dried at 90° . The precipitate is separated from the filter paper, the last traces being dissolved off with nitric acid; this solution is evaporated to dryness, and the bulk of the precipitate added and ignited. Arsenic and nickel are separated in a similar manner.

Separation of Manganese and Cobalt.—A solution of manganese and cobalt ammonium sulphates (0.4 to 0.5 gram) in water (10—15 c.c.) containing a few drops of hydrochloric acid is gradually added to a cold solution of sodium hydroxide (6 grams) and pure potassium cyanide (3.5 grams) in water (50 c.c.); a 3—5 per cent. solution of hydrogen peroxide (20—25 c.c.) is then added, and the mixture warmed on the water bath for half an hour. It is then diluted to 250—300 c.c., and the precipitated manganese collected and thoroughly washed with hot water. The precipitate is dissolved in dilute hydrochloric acid and hydrogen peroxide, again precipitated with ammoniacal hydrogen peroxide, collected, ignited, and weighed as Mn_3O_4 . The filtrate containing the cobalt is acidified with concentrated sulphuric acid and evaporated to complete dryness, whereby the cobalt potassium cyanide is converted into sulphate. The residue is dissolved in hot water, and the cobalt precipitated as hydrated peroxide with a solution of sodium hydroxide and hydrogen peroxide, and finally weighed as Co_3O_4 and Co. It is important that the potassium cyanide is pure, as otherwise the precipitates are contaminated with iron; also the solution becomes contaminated with small quantities of silica, which is separated after the evaporation with sulphuric acid. The separation of manganese and nickel is effected in a similar way.

Estimation of Tin.—A solution of the chloride, $SnCl_4(NH_4Cl)_2$ (0.4—0.5 gram), in water (10 c.c.) containing a few drops of hydrochloric acid, is gradually added to a mixture of water (20 c.c.), concentrated nitric acid (10 c.c.), concentrated ammonia (40 c.c.), and hydrogen peroxide (25—30 c.c.). The mixture is heated on the water bath until the precipitate has completely settled; it is then filtered, and the precipitate washed with a 10 per cent. faintly ammoniacal solution of ammonium nitrate, dried at 95° , ignited, and weighed as SnO_2 . The filtrate, when treated with ammonium sulphide and then with hydrochloric acid, gives no precipitate of tin sulphide.

E. C. R.

Detection of Chromates and Arsenites. By N. TARUGI (*Gazzetta*, 1896, 26, i, 220—222).—The author replies to Antony's criticisms (this vol., ii, 390).

W. J. P.

Estimation of the Colours of Natural Waters. By ALLEN HAZEN (*J. Amer. Chem. Soc.*, 1896, 18, 264—275).—The author prepares a comparison liquid by dissolving platinum chloride in water, and adding a sufficiency of cobalt chloride so as to obtain the desired shade of colour.

The colouring matter in the sample is then expressed in degrees of platinum-cobalt. L. DE K.

Detection of Lead and Copper in Potable Waters.—By CORNELIS GULDENSTEEDEN EGELING (*Ned. Tydschr. Pharm.*, &c., 1896, 113—117).—Two hundred and fifty c.c. of the water is acidified with acetic acid, and hydrogen sulphide is passed through it; 0.5 gram of talc which has previously been boiled with dilute nitric acid is then added and the mixture well shaken. The talc as it settles carries down with it even the merest traces of lead or copper sulphide which may have been present. The liquid is poured off, the deposit collected on a cotton-wool filter, and treated with a few c.c. of hot nitric acid. The acid is then evaporated to dryness in a small dish, and the residue tested for copper and lead in the usual way. L. DE K.

Estimation of Small Quantities of Lead in Water. By UBALDO ANTONY and T. BENELLI (*Gazzetta*, 1896, 26, i, 218—220).—In determining small quantities of lead in water, it is advisable to add a considerable proportion of mercuric chloride to a measured volume of the sample, and then treat with excess of hydrogen sulphide; after adding ammonium chloride to ensure the deposition of all the mercuric sulphide, the bulk of the liquid is removed by decantation, the sulphide collected on a filter, dried, and the residue heated either in a current of hydrogen sulphide and weighed as lead sulphide, or in the air, treated with sulphuric acid and weighed as lead sulphate. The addition of the mercuric chloride prevents the lead sulphide assuming the colloidal soluble form; test analyses gave excellent results. W. J. P.

Estimation of Sodium Salicylate in Presence of "Ichthyol." By J. J. HOFMAN (*Ned. Tydschr. Pharm.*, &c., 1895, 103—104).—The sodium salicylate may be separated from the ichthyol by treating the mixture with water, which will leave the greater part of the ichthyol undissolved, and the last traces may be precipitated from the solution by adding an equal bulk of brine. The salicylic acid can then be extracted in the usual manner by acidifying with hydrochloric acid and agitating with ether. L. DE K.

Determination of the Heat of Bromination in Oils. By HARVEY W. WILEY (*J. Amer. Chem. Soc.*, 1896, 18, 378—383).—The process is a modification of the one proposed by Hehner and Mitchell (*Abstr.*, 1895, ii, 427). The bromine is not added undiluted, but is mixed with 4 volumes of either chloroform or, better, carbon tetrachloride.

Ten grams of the oil is dissolved in either of the solvents and diluted to 50 c.c.; 5 c.c. of this solution is mixed in a specially constructed apparatus with 5 c.c. of the bromine solution, and the rise in temperature is observed by means of a delicate thermometer. The author has tabulated the results of experiments with olive oil, calycanthus seed oil, cotton-seed oil, and sunflower seed oil, using both chloroform and carbon tetrachloride. It is advisable to make at least four trials with a sample. L. DE K.

Estimation of the Solid Fat in Artificial Mixtures of Vegetable and Animal Fats and Oils. By J. HOWARD WAINWRIGHT (*J. Amer. Chem. Soc.*, 1896, **18**, 259—264).—The author recommends the following process for the assay of lard compounds (larderine):—150 grams of the sample is placed in a beaker and heated in a boiling water bath until entirely melted. After an hour, the water is allowed to cool to 75—80 F., and the beaker is then put in a moderately warm place for at least 12 hours. This causes the solid fat to crystallise, and after stirring the contents with a glass rod or spatula, 50 grams is weighed out and carefully wrapped in a double thickness of Canton flannel in which it is subjected to pressure in a small screw press, very gradually at first but afterwards as strongly as possible. After the oil has drained off, the contents of the press are removed and the solid cake is weighed.

The results are accurate within one and a half per cent.

L. DE K.

Estimation of added Water in Milk by taking its Freezing Point. By HARTOG J. HAMBURGER (*Ned. Tydschr. Pharm.*, 1896, 209—212).—The author finds that the freezing point of milk varies from 0.574 to 0.556° below zero.

By using Beckmann's freezing apparatus and a thermometer capable of showing hundredths of a degree or less, it becomes possible to detect with certainty the addition of 2 or 3 per cent. of added water. Several samples of milk may be tested in an hour.

The author is fully aware that before the process can be generally introduced, a great many local experiments will have to be made.

L. DE K.

New Method of Testing Quinine. By MELCHIOR KUBLI (*Chem. Centr.*, 1895, ii, 1058—1059; from *Pharm. Zeit. Russ.*, **34**, 593—598, 609—613, 625—628, 641—646).—The author's process for testing commercial quinine sulphate is based on the fact that whilst the sulphates of the inferior alkaloids are more soluble in water than the pure article, the liberated alkaloids behave in an opposite manner.

1.793 gram of the sample dried at 40—50° is placed in a tared flask with 60 c.c. of water and heated to boiling. After five minutes, the amount of water is increased to 62 grams, and the whole is placed for half an hour in water at 20°, well shaken and filtered. 5 c.c. of the filtrate is put into a narrow glass cylinder, three drops (0.8 c.c.) of a solution of sodium carbonate (1—10) is added, and water is now carefully added from a burette, with constant shaking, until the turbidity has completely disappeared. The operation is twice repeated, and, to make sure, the supposed correct amount of water is added at once, and the turbidity should then vanish by rotating three times. If the sample is pure, 10 c.c. of water will be required; but, if not, a larger quantity will be wanted, depending on the quantity and nature of the accompanying alkaloid. The paper will be continued.

L. DE K.

The Testing of Quinine Sulphate. By OSWALD HESSE (*Arch. Pharm.*, 1896, **234**, 195—203).—The author criticises the water test

and the carbonic anhydride test proposed by Kubli (preceding abstract), and points out that, according to his own experiments, neither of these tests gives such accurate results as the official tests, and further, that the results given by the two tests do not agree with one another.

A. H.

Acidimetric Estimation of Vegetable Alkaloids. A Study of Indicators. By LYMAN F. KEBLER (*J. Amer. Chem. Soc.*, 1895, **17**, 822—831).—The author has experimented with the following alkaloids: quinine, strychnine, morphine, codeïne, and cocaïne; also with the crude alkaloids of nux vomica, ipecacuanha, and belladonna.

As regards the indicators, it can be safely concluded that methyl-orange has lost somewhat of its glory. Litmus solution is also quite unsatisfactory for delicate titrations. Hæmatoxylin may claim the best results, whilst Brazil wood comes second, and cochineal third. The author is studying the behaviour of other indicators.

L. DE K.

A Forensic Examination for Strychnine. By LOUIS LEWIN (*Arch. Pharm.*, 1896, **234**, 272—273).—Polemical.

A. H.

Detection of the Glucosides of Digitalis and the Products of their Hydrolysis by means of Sulphuric acid containing a Ferric Salt. By HEINRICH KILIANI (*Arch. Pharm.*, 1896, **234**, 273—277).—The reaction which the digitalis glucosides give with sulphuric acid is due to the presence of ferric salts in the latter, and is best obtained by using sulphuric acid, to 100 c.c. of which 1 c.c. of a solution of 5 grams of commercial ferric sulphate in 100 c.c. of water has been added. With this reagent the following reactions may be obtained.

Digitalinum verum is coloured a deep golden yellow, and then forms a red solution, which rapidly changes to a permanent reddish-violet. Digitaligenin gives the same reaction, but with greater intensity. Digitoxin becomes very dark coloured, and then forms a dirty brownish-red solution. Digitoxigenin forms a red solution which is strongly fluorescent. Digitonin and digitogenin, on the other hand, produce no coloration whatever.

Digitoxin may be further identified by the fact that, when it is dissolved in acetic acid containing ferric sulphate (prepared in the same way as the sulphuric acid), and sulphuric acid containing the iron salt then poured into the tube so as to form a layer beneath it, a blue coloration is gradually developed in the acetic acid, whilst the sulphuric acid remains colourless. This coloration in the acetic acid is not produced by any other of these compounds. If digitalinum verum is also present, the sulphuric acid becomes reddish-violet, and the acetic acid indigo-blue. (Compare Keller, *Ber. Pharm. Gesell.*, 1895, Part 11.) The application of this very delicate test has shown that no digitoxin is present in the glucosides extracted from the seeds in the ordinary way.

Digitoxin appears only to exist in one modification, the substance described as α -digitoxin being identical with the β -compound previously described by the author.

A. H.

Cubebs and its Adulterants. By KARL PEINEMANN (*Arch. Pharm.*, 1896, **234**, 204—271).—See this vol., i, 494.

F. Hoppe-Seyler's Double Colorimetric Pipette. By GEORG HOPPE-SEYLER (*Zeit. physiol. Chem.*, 1896, **21**, 461—467), and by HUGO WINTERNITZ (*ibid.*, 468—480).—The more extensive use of this apparatus is advised. In the first paper, a number of clinical examinations of blood are given. Hoppe-Seyler's method gives higher results than the other well-known colorimetric methods of Gowers and von Fleischl. The second paper shows that the standard used (carbonic oxide hæmoglobin) is permanent for years, and that the colorimetric results are close to those obtained by analysis. Various details in the method of using the instrument are described in full.

W. D. H.

Estimation of Solid Matter in Beef-Tea. By LEONARD DE KONINGH (*Ned. Tydschr. Pharm., &c.*, 1896, 208).—To a weighed quantity of the warm liquid, a weighed quantity of tannin is added, the moisture in which is, of course, known. The gelatin is at once precipitated and the drying therefore proceeds at a rapid rate on the water bath; a short drying at 98—100° will then give a constant weight from which the weight of the dry tannin added must be deducted. The combination of gelatin with tannin is, according to the author, a purely additive product. The residue is, as a rule, more combustible than that obtained in the ordinary way, and leaves a white ash.

L. DE K.

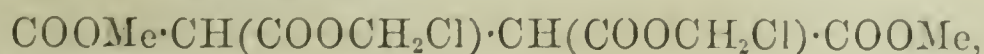
General and Physical Chemistry.

Characterisation of Optically Isomeric Compounds. By PAUL WALDEN (*Ber.*, 1896, 29, 1692—1707).—According to Pasteur, substances containing an asymmetric carbon atom all crystallise in hemihedral forms. This statement can no longer be maintained, since a very large number of optically isomeric compounds are now known which do not crystallise in hemihedral forms, a large number of these from among the alkaloids, sugars, and terpenes being adduced by the author. Numerous cases, moreover, are now known in which the racemic inactive form of a compound does not differ from the active forms in the same way as racemic acid from dextro- and lævo-tartaric acid, by having a higher melting point and smaller solubility. Thus, many racemic forms have the same melting point, and others again a lower melting point than the optically active isomerides to which they correspond. The author has determined the melting point, density, molecular volume, electrical conductivity (coefficient of affinity), solubility, and crystalline form of a large number of optically active substances and of their racemic isomerides, and has come to the following conclusions. (1) Hemihedry is only a frequent, but not a necessary, accompaniment of optical activity. (2) Both the optically active and racemic forms have the same coefficient of affinity (K). (3) The dextro- and lævo-forms of a substance have the same density, solubility, and melting point. (4) The racemic form may have either the same or a lower or a higher melting point than the active isomerides. (5) When the racemic form has a higher melting point it has also a smaller solubility and a smaller molecular volume. (6) Any compound of two oppositely optically active forms of a substance may be considered as a true racemic modification when its crystalline form and density is different from those of the active isomerides. These are usually accompanied by different melting point and solubility.

A. H.

Chlorinated Ethereal Tartrates. By PAUL FREUNDLER (*Bull. Soc. Chim.*, 1895, [3], 13, 1055—1063).—Le Bel (*ibid.*, 9, 674) and Walden (*Abstr.*, 1895, i, 459) have shown that optically active substances which contain an atom of chlorine, bromine, or iodine directly united to an asymmetric carbon atom form exceptions to Guye's law of the product of asymmetry. Le Bel has found that the chloracetate of propyl glycol, in which the chlorine is not directly united to an asymmetric carbon atom, does not behave abnormally; the author has undertaken the study of several ethereal salts of tartaric acid, in which the hydroxyls have been etherified by chloracetic acid, in order to see whether they are also normal.

Methylic dichloracetyl tartrate,



is a syrupy liquid, which distils at 187—190° under a pressure of 14 mm. Its sp. gr. = 1.409 at 18°, and its specific rotatory power $[\alpha]_D = +3.5^\circ$. The corresponding *ethylic* salt boils at 195—197° at 12 mm. pressure, has sp. gr. = 1.311 at 15°, and $[\alpha]_D = +9.4^\circ$. The *propylic* salt boils at 204—205° at 15 mm. pressure; its sp. gr. = 1.245 at 17° and $[\alpha]_D = +11.6^\circ$. The *isobutylic* salt is almost as syrupy as the methylic; it distils at 210—215° at 13 mm. pressure; its sp. gr. = 1.195 at 20°, and its specific rotatory power $[\alpha]_D = +13.9^\circ$. These numbers are normal, in so far as the rotatory power increases with an increase in weight of the alkylic group, but they are abnormal in that they are all dextrogyrate, whereas from the law of the product of asymmetry they should be lævogyrates. The author discusses these facts from a theoretical standpoint. Experiments were also made to show the influence of temperature on the rotatory power; in all cases, the rotatory power increases considerably with an increase in temperature.

Different solvents also have an influence on the rotatory powers of these ethereal salts, just as they have on those of the diphenylacetyl-tartrates and the ordinary alkylic tartrates.

	Benzene solution.	Liquid.
Methylic dichloracetyl tartrate	$[\alpha]_D = -1.1^\circ$	+ 3.5°
Ethylic ,, ,,	$[\alpha]_D = +10.8$	+ 9.4
Propylic ,, ,,	$[\alpha]_D = +9.9$	+11.6
Isobutylic ,, ,,	$[\alpha]_D = +8.0$	+13.9

Alcohol, carbon bisulphide, ethylene dibromide, and chloroform have the same effect on the rotatory powers of the dichloracetyl-tartrates as on those of the diphenylacetyl-tartrates.

The molecular weights, as obtained by the cryoscopic method, in benzene and ethylene dibromide solutions, are also abnormal.

J. J. S.

The Action of Nitrous acid in a Grove's Element. By RUDOLPH IHLE (*Chem. Centr.*, 1895, ii, 428; from *Zeits. Electrotechn. u. Electrochemie*, 1895, 174—175).—If the nitric acid in a Grove's element is gradually diluted with water, the electromotive force remains nearly constant until the acid contains 38 per cent. nitric acid; on further dilution, the E.M.F. falls from 1.8 to 0.7 volt, and with 28 per cent. of nitric acid has the smaller potential. If, however, potassium nitrite is added to the 28 per cent. acid, the potential rises from 0.7 to 1.8 volt, but falls again to 0.7 as soon as the nitrous acid is destroyed by potassium permanganate, hydrogen peroxide, carbamide, &c. Similarly the potential of a >38 per cent. acid is lowered by the addition of potassium permanganate or of carbamide. It therefore follows that nitrous acid is the real depolariser in a Grove's element (compare this vol., ii, 460).

J. J. S.

A Non-sulphating Phospho-accumulator. By HENRY N. WARREN (*Chem. News*, 1896, 73, 191).—Lead grids of special construction are repeatedly pasted with a composition of litharge and phosphoric and sulphuric acids, and dried for hours at 250° F., until biscuit plates are obtained; these are piled with alternate plates of

amalgamated zinc and insulating carbon blocks in dilute sulphuric acid, with or without 12 per cent. of phosphoric acid, until perfectly reduced; they are then washed and peroxidised, being subsequently soaked in dilute phosphoric acid.

D. A. L.

Electrolysis of Hydrogen Chloride without a Membrane.

By FELIX OETTEL (*Chem. Centr.*, 1895, **76**, 3; from *Zeits. Elektro-techn. u. Elektrochemie*, 1895, 57—58).—If hydrogen chloride is electrolysed without a membrane, the decomposition products are formed in amounts far below the theoretical, as the chlorine which dissolves in the liquid is again converted into hydrogen chloride by the hydrogen at the cathode. The solubility of the chlorine in the solution is reduced by the addition of sodium chloride, magnesium chloride, or magnesium sulphate. The most suitable solution for electrolysis is a concentrated solution of sodium chloride to which sulphuric acid has been added. If the sulphuric acid is added in excess, oxygen is liberated towards the end of the process; if sodium chloride is in excess, sodium hypochlorite is formed, and the evolution of gas ceases when the solution becomes neutral.

H. C.

Calculation of the Conductivity of Mixtures of Electrolytes having a common Ion.

By DOUGLAS MCINTOSH (*Phil. Mag.*, 1896, [5], **41**, 510—516).—MacGregor has developed a method of calculating, from observations of a number of simple solutions of two electrolytes having a common ion, the conductivity of a solution containing both electrolytes, the assumption being made that the ionic velocities of the constituent electrolytes are not changed by the mixing. To test the accuracy of the method, the author has examined mixtures of sodium and potassium chloride solutions, and of solutions of sodium and hydrogen chloride. In the case of mixtures of sodium and potassium chlorides, the differences between the calculated and the observed values increase rapidly as the constituent solutions become more and more nearly saturated, reaching 6.4 per cent. in the case of practically saturated solutions. In the weaker solutions of sodium and hydrogen chloride, the differences between the calculated and observed values are evidently due to accidental errors; in the stronger solutions, the differences become more marked and irregular in magnitude.

The results show that in the case of two electrolytes with a common ion which differ so markedly in ionic velocity from one another as sodium chloride and hydrogen chloride, the dissociation theory enables us to calculate the conductivity of solutions containing both, within the limits of experimental error, up to a mean concentration of about 1 gram.-mol. per litre, and that in the case of solutions of greater mean concentration the calculated value is greater than the observed.

H. C.

Conductivity of Solutions of some Salts in Acetone.

By ST. VON LASZCZYNSKI (*Chem. Centr.*, 1895, **76**, 3; from *Zeits. Elektro-techn. u. Elektrochemie*, 1895, 55—57).—The author has determined the conductivities of solutions of the thiocyanates of potassium, sodium, and ammonium, the chlorides of mercury and potassium, potassium iodide, and silver nitrate in acetone, the conductivity of

which was itself negligible. The values obtained for various dilutions show that solutions in acetone have a smaller conductivity than the corresponding aqueous solutions. The resistances increase with rising dilution in such a manner as to prevent the determination of the limiting value for the molecular conductivity, but the values for μ_{∞} are estimated at 160—170 for potassium iodide and >200 for sodium thiocyanate.

In agreement with Ostwald's view, that the differences in the molecular conductivities depend on the internal friction of the solvents, acetone solutions show higher values for μ_{∞} than aqueous solutions.

H. C.

Electrolysis of Solutions of Salts in Acetone. By ST. VON LASZCZYNSKI (*Chem. Centr.*, 1895, 76, 3; from *Zeits. Elektrotechn. u. Elektrochemie*, 1895, 57).—A solution of potassium iodide in acetone can be decomposed by the current from six Meidinger cells; iodine appears at the anode and a gas at the cathode. A solution of lithium chloride electrolysed with 100 volts yields lithium at the cathode. The thiocyanates of potassium, sodium, and ammonium give with 7 volts and 0.5 ampère the corresponding amalgam when mercury is used as the cathode; with copper or platinum cathodes a yellow, amorphous deposit is formed, and bubbles of gas appear on both electrodes. From a silver nitrate solution, the metal separates on the cathode.

H. C.

Estimation of the Heat of Combustion of Fuels. By WALTHER HEMPEL (*Zeit. angew. Chem.*, 1896, 350—352).—The material, coal, for instance, is burnt in a calorimetric bomb. The bomb is then heated, and the steam passed into a weighed calcium chloride tube, to which a calcium chloride guard tube has been attached. To collect all the water, the guard tube is connected with a filter pump, and the bomb exhausted. By alternately admitting air and exhausting, the last traces of water may be collected in the weighed tube. The available heating effect is then found by allowing 600 calories for each unit of water.

L. DE K.

Reaction Velocity in the Conversion of Diazoamido- into Amidoazo-derivatives. II. By HEINRICH GOLDSCHMIDT and R. U. REINDERS (*Ber.*, 1896, 29, 1899—1907; compare this vol., ii, 515).—Benzenediazoamidotoluene is converted by aniline hydrochloride in aniline solution into amidoazobenzene, and not into tolueneazoaniline. The conversion of paradiazoamidotoluene into amidoazotoluene in paratoluidine solution by paratoluidine hydrochloride proceeds in the normal manner, the rate of change being proportional to the concentration of the hydrochloride of the base.

Experiments with the hydrochloride, trichloracetate, and dichloracetate of aniline and diazoamidobenzene show that the rate of change is roughly proportional to the rate of inversion of sugar produced by the corresponding acids in aqueous solution. The authors therefore consider it probable that the effective agent in the production of the change is the hydrogen ion of the acid combined with the anilide, and that aniline hydrochloride is decomposed in aniline solution into the acid and the base. This view is

supported by the fact that the solubility of hydrogen chloride in aniline is raised by the addition of indifferent compounds to the aniline in the same way as that of hydrated salts in water. The same thing holds for solutions of picric acid in toluidine. A further confirmation of this view is that diazoamidobenzene is converted into amidoazobenzene in dimethylaniline solution by weak acids, such as benzoic acid, which crystallise out in the free state from solution in dimethylaniline. A. H.

Note.—The authors do not discuss the possibility that the change may be brought about by the “ammonium ion” $C_6H_5 \cdot NH_3$, of the dissociated salt.—A. H.

Etherification of Substituted Acetic acids. By D. M. LICHTY (*Amer. Chem. J.*, 1896, **18**, 590—600; compare Abstr., 1895, ii, 159). A temperature of 80° was deemed more suitable than that previously used (154° ; *loc. cit.*) for the determination of etherification values, and for the sake of better comparison than could be obtained by the former method, the estimations were made at much shorter intervals, namely, 1, 3, 5, 10, &c., minutes, instead of 1, 2, 4, 6, &c., hours. The following results were obtained.

	Initial rate (one minute).	Limit of etherification.
Chloracetic acid	1.78 per cent.	68.65 per cent.
Dichloracetic acid	4.56 „	71.22 „
Trichloracetic acid	9.99 „	74.00 „

The limit of etherification of acetic acid is 66.57 per cent. It will be seen that the influence of chlorine is much greater on the rate of etherification than on the limit. A. G. B.

Apparatus for Distillation in a Vacuum. By PAUL C. FREER (*Amer. Chem. J.*, 1896, **18**, 585—586).—An improved receiver for distillation in a vacuum in which the receiving tubes are contained in a bell-mouthed cylinder closed at the shoulder by a gutta-percha plug, through which pass the condensing tube, the rotatory shaft which carries the receiving tubes, and the tube connected with the vacuum pump; the bell mouth of the cylinder contains mercury, which forms an air-tight layer over the gutta-percha plug. A. G. B.

Apparatus for the Electrolysis of Hydrochloric acid. By GEORGE O. HIGLEY and B. J. HOWARD (*Amer. Chem. J.*, 1896, **18**, 584—585).—An improved apparatus for demonstrating the volumetric composition of hydrochloric acid by electrolysis, in which the liberated gases traverse but a small layer of liquid, and are collected and measured in tubes distinct from those containing the electrodes. A. G. B.

Lecture Experiment: Electrolysis of Hydrochloric acid. By J. M. PICKEL (*Ber.*, 1896, **29**, 1942—1945; compare L. MEYER, Abstr., 1894, ii, 232).—The production of less chlorine than hydrogen when hydrochloric acid is electrolysed in a lecture experiment, has been

already explained, and to some extent obviated by L. Meyer (*loc. cit.*). The author describes a form of apparatus in which the electrolyte is the only liquid through which the escaping chlorine must travel; the gas itself is not measured, but is caused to displace its own volume of air, which can then be estimated. By means of the new apparatus, a lecture experiment yields results which approximate closely to those required by theory. M. O. F.

Apparatus for demonstrating that two Volumes of Hydrogen and one Volume of Oxygen form two Volumes of Water Vapour. By PAUL C. FREER (*Amer. Chem. J.*, 1896, **18**, 586—587).—An improved tube for demonstrating the volumetric composition of steam in which the eudiometer tube has a stopcock at its upper end, and is attached to a flexible tube from a mercury reservoir at its lower end. A. G. B.

Volumetric Composition of Ammonium Chloride. By DOUGLAS JOHN CARNEGIE and H. WALES (*Chem. News*, 1896, **73**, 206).—A tube is used, open below, stoppered at the top, and divided by a stopcock into two portions, so that the lower portion down to a mark is of twice the capacity of the upper portion. The upper portion is filled with dry hydrogen chloride, the lower portion with kerosene, saturated with dry ammonia; it is inverted in a glass trough containing the same liquid, and then filled down to the mark with dry ammonia; on opening the stopcock combination ensues, and in course of time the lower portion of the tube becomes filled with the kerosene, whilst the upper portion contains the ammonium chloride and the excess of ammonia, 1 vol. D. A. L.

Inorganic Chemistry.

Ozone. By CARL ENGLER and W. WILD (*Ber.*, 1896, **29**, 1929—1940).—Various hypotheses have been advanced to account for the production of a mist when ozone is led through a reducing agent and brought in contact with water vapour. It has, for instance, been stated that oxygen, when electrified, yields two modifications, ozone and antozone, the latter being characterised by producing the mist in question on removal of the former; this view was shown to be incorrect by Engler and Nasse, who pointed out that the hypothetical antozone was only formed on decomposing the ozone, at the same time suggesting that the fog producer is not a modification of oxygen, but the vapour of hydrogen peroxide. The present investigation indicates that this conclusion in turn has no experimental foundation, having established the fact that the fog under discussion consists of definite chemical compounds, usually solids, produced by the oxidation of a deozoneiser. These substances are finely divided, or in some cases develop mist, owing to their hygroscopic

properties; they may be acidic, neutral, or even basic, and escape absorption by water or alkalis entirely from mechanical causes.

The production of mist is found to depend on the presence in the deozoneiser of a gaseous, or readily volatile substance, capable of yielding a solid, or hygroscopic, product of oxidation. Thus the phenomenon is observed in the case of solutions containing iodine, or from which iodine is liberated under the influence of ozone, this being oxidised to iodic acid; sulphurous acid yields sulphuric acid, whilst ammonia and solutions of ammonium salts give rise to ammonium nitrate. Liquids containing hydrogen sulphide owe their fog-producing character to the liberation of sulphur.

For the experimental evidence on which these conclusions are based, together with the explanation of minor points in connection with this phenomenon, reference must be made to the original paper.

M. O. F.

Oxidation of Sodium Sulphide and Hydrosulphide to Sulphate by Electrolysis. By FRANK W. DURKEE (*Amer. Chem. J.*, 1896, 18, 525—536).—During the electrolysis of a dilute solution of sodium sulphide (containing about 3.4 grams of sodium in 400 c.c.) by a current of about 3 ampères (voltage not given), hydrogen was evolved at the cathode, and the liquid became yellow, at first around the cathode and ultimately throughout; light yellow sulphur then appeared on the anode, but scaled off again, and in greater part dissolved; fine white sulphur next separated near the surface of the liquid about the anode, but dissolved as it sank through the solution until a certain stage of the electrolysis, when the yellow colour of the liquid disappeared, and the white sulphur settled in the beaker; subsequently more oxygen escaped than at any previous stage. Experiments, in which sodium thiosulphate solution and sodium polysulphide solution respectively were electrolysed, showed that the separation of white sulphur described above connotes the oxidation of thiosulphate, whilst the separation of yellow sulphur is incidental to the presence of polysulphide. These facts, in conjunction with the analytical data given in the paper, indicate that the course of oxidation of sodium sulphide by electrolysis is similar to that of its oxidation by air, which has been elucidated by Lunge; the sulphide is first oxidised to hydroxide and thiosulphate, the latter passing to sulphate with separation of sulphur; this sulphur dissolves in unaltered sulphide to form polysulphides, which are oxidised to thiosulphate with separation of sulphur. Thus during the electrolysis, sulphides disappear first, then the hydroxide, and finally the thiosulphate, the sulphate being virtually the end product. It was noticed that when attempts were made to electrolyse sodium sulphide solution with an alternating current, the platinum electrodes dissolved, whereas no such dissolution was noticed in the case of the direct current electrolysis.

A. G. B.

Volatility of Red Phosphorus. By HENRYK ARCTOWSKI (*Zeits. anorg. Chem.*, 1896, 12, 225—228).—When commercial red phosphorus is heated for 10 days at a temperature of 108° in an apparatus so arranged that the volatile products are condensed on a cold tube,

crystal skeletons are obtained, consisting of nodules of yellow phosphorus, containing small pieces of the red modification. Red phosphorus, previously washed with carbon bisulphide, when heated at 100° for 48 hours in a vacuum of 14—16 mm., volatilises, and forms carmine-red, transparent, microscopic crystals, which are not, however, well formed.

E. C. R.

Action of Hydrogen Iodide and of Phosphonium Iodide on Thiophosphoryl Chloride. By ADOLPHE BESSON (*Compt. rend.*, 1896, 122, 1200—1202).—Hydrogen iodide dissolves without change in thiophosphoryl chloride cooled in a mixture of ice and salt, but at 0° hydrogen chloride and hydrogen sulphide are given off, and the liquid contains free iodine and phosphorus triiodide, the action being analogous to that of hydrogen iodide on phosphorus oxychloride (this vol., ii, 472).

In sealed tubes at temperatures above 0° , the reaction is more complex, and the products depend on the temperature. In all cases iodine is liberated, hydrogen chloride and sulphide are given off, and the liquid contains phosphorus triiodide and a mixture of phosphorus trisulphide and pentasulphide in varying proportions, together with small quantities of the thioiodide, P_2SI_2 , an orange solid, which melts at about 75° , and is very soluble in carbon bisulphide. The thioiodide does not sublime in a vacuum, decomposes when exposed to air, and readily when heated. In order that it may be formed in appreciable quantity, the solution of hydrogen iodide in the thiophosphoryl chloride must not be heated above 30 — 40° .

Phosphorus trisulphide is formed in very small quantity only by the action of hydrogen sulphide on phosphorus triiodide. It is, however, formed by the action of phosphonium iodide on thiophosphoryl chloride, and the author considers that an unstable thiophosphoryl iodide, PSI_3 , is first formed, and subsequently decomposes into the trisulphide, triiodide, and free iodine.

C. H. B.

Crystalline Silicon. By GUILLAME J. L. DE CHALMOT (*Amer. Chem. J.*, 1896, 18, 536—540).—The author finds that the mixture of silica, lime, and carbon, which he heats in an electric furnace for the purpose of obtaining calcium silicide and crystalline silicon (this vol., ii, 473), yields very little of the former product unless it contains iron. The mixture of silicide and silicon is specifically lighter than the slag, and, moreover, tends to move towards the cathode; hence separation is aided if the furnace be upright and the cathode the upper electrode. Mixtures containing Mn_3O_4 , quartz, charcoal, and lime, when heated in the electric furnace, yielded mixtures consisting mainly of a manganese silicide, probably $MnSi_2$, and crystalline silicon, which were separated by treatment with hydrofluoric acid and hydrochloric acid; the yield of silicon was 33 per cent., and it contained 97.77 per cent. of silicon, and was free from manganese.

A. G. B.

Action of Metals on Nitric acid. By GEORGE O. HIGLEY and W. E. DAVIS (*Amer. Chem. J.*, 1896, 18, 587—590; compare Abstr.,

1895, i, 164).—Figures and curves are given illustrative of the action of nitric acid of diverse strengths (sp. gr. 1.05—1.40) on silver foil. Neither nitrogen nor nitrous oxide was produced in any of the experiments; nitric peroxide is the principal reduction product with concentrated acid, accounting for over 70 per cent. of the metal dissolved; the decrease of this gas and the complementary increase of nitric oxide as the acid is diluted is due to the decomposition of the nitric peroxide into nitric acid and nitric oxide by water.

A. G. B.

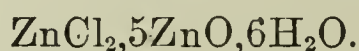
Silver Peroxynitrate. By EDUARD MULDER and J. HERINGA (*Rec. Trav. Chim.*, 1896, **15**, 1—51).—The authors have investigated Ritter's black compound formed, under certain circumstances, in a silver voltameter when an aqueous solution of silver nitrate is electrolysed (compare also *Ann. Chim. Phys.*, 1880, [5], **21**, 174, and *Compt. rend.*, 1882, **94**, 573, and 653). The apparatus used consisted of a platinum reservoir of about 1 litre capacity, which served as the cathode, and which was nearly filled with a silver nitrate solution; the anode was formed of platinum wire, and placed just under it was a small glass vessel, which served to collect the black compound as it was formed. Two series of experiments were made, one series in which the solution was kept neutral by means of silver carbonate, and the other series in which the solution was not neutralised. Solutions of different strengths were used, the strongest contained 1000 grams silver nitrate in 1 litre of solution; weaker solutions were also tried, and experiments are being carried on with still weaker. Minute details as to the methods of analysis adopted are given; in most cases two or three different methods were tried. The black compound is liable to undergo spontaneous decomposition, oxygen being eliminated at the ordinary temperature and also on slightly warming; this oxygen the authors term the *oxygen excess*. Besides determining this oxygen excess, the authors have also estimated, in each case, the amount of silver nitrate and silver oxide, Ag_2O , contained in the black compound. The quantity of the compound deposited on the anode has also been determined, together with the amount of silver deposited on the cathode. The analysis of the black compound, obtained from very concentrated solutions, points to the composition $3\text{Ag}_2\text{O}, 5\text{O}, \text{AgNO}_3$, perhaps $2\text{Ag}_3\text{O}_4, \text{AgNO}_3$, or $3\text{Ag}_2\text{O}_2, \text{AgNO}_3$.

There appears to exist a maximum of concentration with which a maximum of formation of the black compound coincides; the latter dissolves in nitric acid, yielding a brown solution. This accounts for the silver nitrate solution turning brown when electrolysed, as nitric acid is then set free. The compound is decomposed by water, but only very slowly, and the decomposition depends on the quantities and relationships of other substances present, for example, nitric acid, silver nitrate, &c.

J. J. S.

Decomposition of Zinc Chloride by Water. By F. LOUIS PERROT (*Bull. Soc. Chim.*, 1895, **13**, 975—979).—The oxychloride of zinc, which is obtained on diluting a syrupy solution of zinc chloride

with water, has been shown by André (*Ann. Chim. Phys.*, 1885, [6], 3, 95) to have the composition $\text{ZnCl}_2, 5\text{ZnO}, 8\text{H}_2\text{O}$. The author finds that a precipitate is formed when pieces of pure anhydrous zinc chloride are dissolved in excess of water. This precipitate, when dried at 38° over sulphuric acid, has the composition



The difference between the two compounds is, beyond doubt, due to the different methods of drying.

The author has followed this decomposition quantitatively by estimating the amount of oxychloride formed on dissolving the same quantity of zinc chloride in different quantities of water.

The point of equilibrium appears to be reached when 75 molecular proportions of water are used to each molecular proportion of zinc chloride.

J. J. S.

Preparation of pure Zinc Sulphate from Crude Zinc Vitriol. By J. KNOBLOCH (*Chem. Centr.*, 1895, 11, 435—436; from *Pharm. Zeit.*, 40, 472—473).—The boiling zinc vitriol solution is treated with sufficient zinc fluoride to precipitate all the calcium and magnesium, but an excess should not be used, or if used should be removed by gypsum. Zinc oxide, mixed with water, is then added, the whole is left for a day, with occasional stirring, then filtered, acidified with a little sulphuric acid, and the filtrate evaporated till it begins to crystallise. If the crystals contain chlorine, it is necessary to recrystallise from water.

J. J. S.

Cupric Sulphide. By JOHN B. COPPOCK (*Chem. News*, 1896, 73, 262).—Copper sulphide precipitated in the presence of free acid is found to be contaminated with free sulphur; when, however, solution of copper sulphate in known excess is added to a solution containing a known quantity of hydrogen sulphide, the weight of precipitate obtained indicates the composition CuS ; the existence of a sulphide of this composition has been disputed.

D. A. L.

Colloïd Compounds of Rare Metals. By MARC DELAFONTAINE (*Chem. News*, 1896, 73, 284).—When ammonia, in amount just sufficient to give a faint odour and turn blue litmus red, is added to a moderately strong solution of yttrium acetate, a slightly opalescent solution is obtained, which becomes turbid, but forms no precipitate; on boiling, however, it deposits a jelly, which redissolves on cooling, provided the boiling is not prolonged; when dialysed, ammonium acetate and part of the earthy acetate pass through the membrane. By leaving yttria many days in a clear solution of normal acetate and stirring frequently, the earth dissolves, and the same colloïd compound is obtained in a transparent, opaline, slightly fluorescent solution, depositing no sediment, having a strongly astringent, slightly sweetish taste, and turning red litmus blue. It is not very stable, especially after long dialysis; it coagulates on boiling, or even at about 60° , and when evaporated at the lowest possible temperature, it leaves a varnish that does not “integrally”

redissolve in cold water; when calcined, it chars to some extent, owing to retention of acetic acid. Didymium, lanthanum, and erbium acetates give similar compounds, the didymium colloidal solution being less stable than that of yttrium. D. A. L.

Action of Water, &c., on Aluminium. By EDUARD DONATH (*Chem. Centr.*, 1895, 11, 589; from *Zeits. angew. Chem.*, 1895, 141).—Hard aluminium foil is not attacked by boiled water which is free from air, whereas ordinary water acts on it appreciably. Calcium sulphate solution has no action, but solutions of chlorides, and especially of nitrates, dissolve the foil readily. Fats, fatty acids, and fused anhydrous phenol are all without action, but a 10 per cent. boiling solution of phenol forms yellow spots, and part of the aluminium goes into solution. The author attributes this more to the action of the air than to that of the phenol. J. J. S.

Chemistry of Iron. By EDUARD DONATH (*Chem. Centr.*, 1895, 1, 1010—1011; from *Oesterr. Zeits. Berg-Hütt.*, 43, 147—152).—The author has repeated Bourgeois and Schützenberger's experiments (this Journal, 1875, 788). He has treated large lumps of spiegeleisen with sodium-copper chloride solution, then with a ferric chloride solution previously acidified with hydrochloric acid, and finally with very dilute hydrochloric acid; a brown residue was obtained, which, on treatment with nitric acid, yielded nitrographitoic acid to which Bourgeois and Schützenberger have ascribed the formula $C_{22}H_{17}(NO_2)O_{11}$. It is readily soluble in water, yielding a deep black solution; the *ammonium* salt yields even deeper coloured solutions. The *barium* and *lead* salts have also been prepared; both are insoluble in water, and could not be obtained in a crystalline form.

The author has also repeated De Koninck's experiments (*Chem. Centr.*, 1891, i, 438), and has treated spiegeleisen with warm, dilute, sulphuric acid (1 : 5); he finds that a fatty organic residue remains, and that this dissolves in ether, yielding a deep yellow solution. It follows that, on treatment with acids, the combined carbon in iron yields, besides volatile products, non-volatile organic compounds, part of which are soluble in water and part in ether. This points to the conclusion that the carbon exists in iron in the form of different carbides of high molecular weight. J. J. S.

Molybdenite and the Preparation of Molybdenum. By M. GUICHARD (*Compt. rend.*, 1896, 122, 1270—1272).—Molybdenite from Sweden was found to contain small quantities of iron and silica with traces of manganese and minute traces of selenium.

When heated in a carbon tube in the electric furnace with a current of 350 ampères and 60 volts, sulphur and sulphurous anhydride are given off. With 900—950 ampères and 50 to 55 volts, molybdenite fuses in two minutes, and decomposes with liberation of carbon bisulphide, sulphur, and a little selenious anhydride. After three minutes, decomposition is almost complete, and after five minutes the molybdenum is saturated with carbon, and the whole of the sulphur

is expelled. The product contains about 91 per cent. of molybdenum, 2 per cent. of iron, and 7 per cent. of carbon. C. H. B.

Niobium. By AKSEL LARSSON (*Zeits. anorg. Chem.*, 1896, **12**, 188—207).—In order to obtain crystalline niobates, the author fuses the amorphous niobates with their respective chlorides, and also according to Ebelmen's method with boric acid in a porcelain furnace. The crystalline niobates obtained by the dry method are not attacked by cold or boiling dilute acids, and they are only decomposed by concentrated sulphuric acid at its boiling point. They are decomposed with difficulty by means of fused potassium hydrogen sulphate, and a complete decomposition is effected only at a red heat. They are partially decomposed by a mixture of hydrofluoric acid and sulphuric acid at the temperature of the water bath. The analysis is effected by decomposing the salts with potassium hydrogen sulphate. The melt is lixivated with water, and the niobic acid separated by filtration, and washed with a dilute solution of ammonium nitrate or carbonate. The niobic acid is then ignited, and again fused with potassium hydrogen sulphate, this operation being repeated, if necessary, until the salt is completely decomposed. The niobic acid is finally heated over the blowpipe and weighed.

Magnesium niobate, $4\text{MgO},\text{Nb}_2\text{O}_5$, is obtained by adding magnesium chloride to a solution of potassium niobate, and fusing the precipitate with anhydrous magnesium chloride. By lixivating the melt with water and hydrochloric acid, the crystalline salt is obtained. It crystallises in tablets and prisms belonging to the hexagonal system: sp. gr. = 4.43.

Magnesium niobate, $\text{MgO},\text{Nb}_2\text{O}_5$, is obtained by fusing the precipitated salt with boric acid, and lixivating the melt with water. It forms small prismatic crystals, showing a stronger double refraction than calcium metaniobate.

Calcium niobate, $2\text{CaO},\text{Nb}_2\text{O}_5$, is obtained by precipitating a solution of calcium niobate with calcium chloride, and fusing the precipitate with anhydrous calcium chloride. By lixivating the melt with water, the salt is obtained in thick needles, mixed with slender needles of niobic acid.

Calcium niobate, $\text{CaO},\text{Nb}_2\text{O}_5$, obtained by fusing the precipitated salt with boric acid and lixiviation with dilute hydrochloric acid, crystallises in needles and short prisms which probably belong to the rhombic system: sp. gr. = 4.12.

Copper niobate, $\text{CuO},\text{Nb}_2\text{O}_5$, obtained by fusing the precipitated salt with boric acid and lixiviating with dilute hydrochloric acid, forms crystalline aggregates having lustrous faces: sp. gr. = 5.60.

Zinc niobate, $\text{ZnO},\text{Nb}_2\text{O}_5$, sp. gr. = 5.69, forms brown crystalline aggregates which have a colour and lustre similar to zinc blende.

Cadmium niobate, $\text{CdO},\text{Nb}_2\text{O}_5$, sp. gr. = 5.93, forms a yellowish-brown crystalline powder.

Cobalt niobate, $\text{CoO},\text{Nb}_2\text{O}_5$, sp. gr. = 5.56, is obtained as a dark blue crystalline powder, having a faint double refraction.

Yttrium niobate, $\text{Y}_2\text{O}_3,\text{Nb}_2\text{O}_5$, sp. gr. = 5.52, is obtained by fusing the precipitated salt with yttrium chloride. *Yttrium niobate*,

$\text{Y}_2\text{O}_3, 3\text{Nb}_2\text{O}_5$, sp. gr. = 4.83, is obtained by fusing the precipitated salt with boric acid. It crystallises in slender needles.

Manganese niobate, $3\text{MnO}, 5\text{Nb}_2\text{O}_5$, sp. gr. = 4.97, is a dirty green crystalline powder consisting of prismatic needles and tablets.

Thorium niobate, $5\text{ThO}_2, 16\text{Nb}_2\text{O}_5$, sp. gr. 5.21, is obtained by fusing the precipitated salt with boric acid. It crystallises in prismatic needles.

Zirconium niobate, $\text{ZrO}_2, 5\text{Nb}_2\text{O}_5$, sp. gr. = 5.14, crystallises in slender truncated needles.

When lanthanum, barium, and strontium niobates, obtained by precipitating potassium niobate with the respective chlorides are melted with the anhydrous chlorides, niobic acid is obtained. A crystalline *lanthanum niobate*, containing 78.5—78.8 per cent. Nb_2O_5 and 18.5—20 per cent. La_2O_3 , is obtained by fusing the precipitated salt with boric acid. The author has also obtained crystalline salts from precipitated nickel, beryllium, barium, strontium, and uranium niobates by fusing them with boric acid.

When niobic acid is heated with carbon in an electric arc, a metallic crystalline regulus is obtained. 0.1370 gram of this product, when heated in a current of oxygen, gave 0.1745 gram Nb_2O_5 and $\text{CO}_2 = 0.0068$ gram C.

E. C. R.

Preparation of Sodium Thioantimonate (Schlippe's Salt). By LÉON PRUNIER (*J. Pharm.*, 1896, [6], 3, 289—290.—Purified antimony trisulphide is melted with a third of its weight of sulphur, and is thus converted into the pentasulphide; this is pulverised and introduced into a flask fitted with a cork and glass tube, and is then treated with a boiling solution of sodium sulphide (one part of crystalline sulphide to 15 of water). On cooling, the liquid is filtered, and the filtrate evaporated to a small bulk, when Schlippe's salt, $\text{Sb}_2\text{S}_5, 3\text{Na}_2\text{S} + 18\text{H}_2\text{O}$, separates in the crystalline form.

J. J. S.

Chemistry of the Cyanide Process for dissolving Gold. By GEORGE A. GOYDER (*Chem. News*, 1896, 73, 272—273; compare this vol., ii, 28).—Hydrogen sulphide, or an alkaline sulphide, is found to interrupt the solvent action of potassium cyanide solution on gold, which, however, can be restored by means of mercuric oxide or chloride.

Experiments with portions of the same cyanide solutions, show that when exposed to zinc alone more gold is deposited than when exposed to both zinc and iron in contact, and, moreover, a loss of soluble cyanide occurs in the latter, but not in the former case.

With regard to the so-called "selective" action of dilute cyanide solutions for gold, it is pointed out that the dissolution of copper in potassium cyanide is a function of concentration, whilst the dissolving of gold in potassium cyanide depends on the proportion of oxygen present, which is a function of dilution, consequently more gold than copper is dissolved by the more dilute solutions; moreover, gold is dissolved by the double cyanides, and is apparently not precipitated except by the interaction of a free metal.

D. A. L.

Double Salts of Ruthenium and Silver. By L. BRIZARD (*Bull. Soc. Chim.*, 1895, [3], 13, 1092—1093).—The double chloride of nitroso-ruthenium and potassium, when treated with an ammoniacal solution of silver chloride, gives at once a rose-coloured crystalline precipitate of a compound, $\text{RuNOCl}_3, 2\text{AgCl}, \text{NH}_3$. This compound is decomposed by water, giving a precipitate of silver chloride; it is sparingly soluble in ammonia, readily in sodium thiosulphate or potassium cyanide solution. When heated it first melts, and then decomposes, yielding fumes of ammonium chloride. The corresponding bromine derivative, $\text{RuNOBr}_3, 2\text{AgBr}, \text{NH}_3$, which may be prepared in a similar manner, forms clear, green crystals, and in its properties resembles the above compound. J. J. S.

Mineralogical Chemistry.

Classification of Minerals according to the Periodic System of the Elements. By E. SCHULZE (Marburg) (*Zeits. Kryst. Min.*, 1896, 26, 189—191).—In a tabular arrangement with five classes, namely, elements, thiodids, haloids, oxygen salts, and sulpho-salts, the groups are arranged according to the valency of the acid radicle. L. J. S.

Arsenic in Coal. By W. M. DOHERTY (*Chem. News*, 1896, 73, 191—192).—Various New South Wales coals were examined for arsenic, but none was detected. Lead and copper were found in two instances. D. A. L.

Acanthite from Colorado. By ALBERT H. CHESTER (*Zeits. Kryst. Min.*, 1896, 26, 526; from *School of Mines Quart.*, 1894, 15, 103—104).—Acanthite occurs at the Enterprise mine, near Rico, as iron-black crystals of orthorhombic habit, and showing striated prisms with a basal plane or with acute terminations. The material is silver sulphide, with 12.58 per cent. of sulphur and traces of iron and copper. With the crystals is a massive silver sulphide, which is considered to be acanthite rather than argentite. L. J. S.

Pseudomorphs of Copper Oxides and Sulphides. By PAVEL V. VON JEREMÉEFF (*Zeits. Kryst. Min.*, 1896, 26, 333—334; from *Verh. k. russ. min. Ges.*, 1894, 31, 398—400).—The following pseudomorphs from various Russian localities are described. Kaolin (steinmark) after malachite. Tenorite after cuprite and chalcotrichite. Pyrrhotite after cuprite; here the cuprite has first been oxidised to tenorite, and this afterwards replaced by pyrrhotite. Copper pyrites after copper glance. Cuprite after malachite. L. J. S.

Pickeringite from the River Mana District. By WALDIMIR ALEXÉEFF (*Zeits. Kryst. Min.*, 1896, 26, 336; from *Verh. k. russ. min. Ges.*, 1894, 31, 350—351).—Besides the normal white mineral of this

locality, a yellow variety of pickeringite is found, in which most of the alumina is replaced by ferric oxide, and the magnesia by ferrous oxide.
L. J. S.

Analyses of Samarskite, Pyrochlore, Tantalite, and Niobite [Columbite]. By K. VON CHRUSTSCHOFF (*Zeits. Kryst. Min.*, 1896, **26**, 335—336; from *Verh. k. russ. min. Ges.*, 1894, **31**, 415—417).—
I. Samarskite from the Urals. II. Pyrochlore from the Urals.

	Ta ₂ O ₅ .	Nb ₂ O ₅ .	TiO ₂ .	SiO ₂ .	GeO ₂ .	SnO ₂ .	ZrO ₂ .	ThO ₂ .	UO ₃ .	WO ₃ .
I.	11.18	32.02	0.68	0.12	0.07	0.79	1.03	1.73	11.23	1.41
II.	—	56.01	8.32	—	trace	—	trace	4.28	—	—

	Ce ₂ O ₃ .	Di ₂ O ₃ .	La ₂ O ₃ .	Yt ₂ O ₃ .	Er ₂ O ₃ .	Fe ₂ O ₃ .	Al ₂ O ₃ .	FeO.	MnO.	CaO.
I.	0.25	1.56	0.37	7.83	13.37*	2.13	0.19	11.15	0.69	0.51
II.	2.16	1.94	1.23	0.56		—	—	2.52	—	14.05

	MgO.	PbO.	ZrO.	UO.	K ₂ O.	Na ₂ O.	H ₂ O.	F.	Total.	Sp. gr.
I.	0.41	0.15	0.17	—	0.21	0.28	1.22	—	100.77	5.899
II.	—	—	—	2.63	0.87	3.35	—	2.77	100.69	4.354

III. Tantalite from Finland. IV. Columbite from N. Carolina.

	Ta ₂ O ₅ .	Nb ₂ O ₅ .	TiO ₂ .	GeO ₂ .	SnO ₂ .	WO ₃ .	FeO.	MnO.	Total.	Sp. gr.
III.	23.97	49.56	0.77	0.02	2.17	0.96	9.86	11.98	99.29	6.211
IV.	68.15	11.15	trace	0.03	1.65	1.29	15.32	2.61	100.69	7.314

L. J. S.

Chemical Composition and Optical Characters of Russian Albite. By SERGEI F. GLINKA (*Zeits. Kryst. Min.*, 1896, **26**, 509—515; from *Verh. k. russ. min. Ges.*, 1894, **31**, 1—154).—Analyses and the optical constants (extinction and double refraction in plates cut in certain directions, and orientation of the acute bisectrix) are given of albite from various Russian localities. I. Crystals from Slatoust; sp. gr. 2.62 to 2.626. II. Crystals, enclosing rutile, from Kyschtym; here about 0.5 per cent. TiO₂ is included in the SiO₂ and Al₂O₃ in the analysis. III. From Kiräbinsk. IV. From the Melnikow mine, S. Urals. In these cases the calcium, &c., is considered to be present in enclosures, and from the observations the following optical constants are deduced for pure albite. Optic axial angle = 73—74°, $\gamma - \alpha = 0.01$, extinction on (001) = 3° 50', extinction on (010) = 20° 30', angle between a plane s perpendicular to the acute bisectrix and (001) = 79°, angle between the plane s and (010) = 14° 24'.

	SiO ₂ .	Al ₂ O ₃ .	Na ₂ O.	K ₂ O.	CaO.	MgO.	Total.	Sp. gr.
I.	68.47	19.64	11.12	trace	—	—	99.23	—
II.	68.04	20.01	11.09	0.80	0.42	0.12	100.48	2.623
III.	68.49	19.59	11.43	0.40	0.49	—	100.40	2.625
IV.	68.63	20.68	10.55	0.34	0.77	—	101.02	—
V.	66.73	19.87	10.29	0.25	1.22	0.50	98.86	2.623
VI.	66.12	20.88	9.37	0.97	1.89	—	99.23	2.624

* 6 per cent. of Th. (6 per cent. of Tr. in the original).

V. Albite from Mursinka, this corresponding to $Ab : An = 15 : 1$; optic axial angle $= 75^{\circ} 30'$, extinction on (001) $= 2^{\circ} 54'$, extinction on (010) $= 17^{\circ} 18' - 17^{\circ} 30'$. VI. Albite from Finland; here $Ab : An = 10 : 1$; extinction on (001) $= 2^{\circ} 30'$, on (010) $= 16^{\circ}$, the position of the acute bisectrix also varies somewhat from that of pure albite.

In these albites there is a connection between the optical characters, but not the crystallographic characters, and the chemical composition. The plagioclastic feldspars are considered neither to form an isomorphous group nor to be double salts, but to be mixtures in various proportions of albite and anorthite, in which the optical characters and the specific gravity vary proportionately with the amounts of these constituents.

L. J. S.

Glaucosite. By PETR A. ZEMJATSCHENSKY (*Zeits. Kryst. Min.*, 1896, 26, 516—517; from *Travaux Soc. Naturalistes St. Petersbourg*, 23, Sect. d. Géol. et d. Minér., 53—60).—By means of heavy solutions, the author has separated glaucosite grains having different characters as regards sp. gr., colour (green to yellow-brown), and the size of the grains. Glaucosite is completely decomposed by warm, 10 per cent. hydrochloric acid. On heating to 115° , there is a change in colour and lustre. Green grains, of 0.5—1 mm. diam., from Waywora, gave, on analysis, the results under I. Under the microscope, the material is sometimes seen as an aggregate of six-sided plates, and is distinctly dichroic. Sp. gr. 3.0400. At $100 - 110^{\circ}$ there is a loss of 2.8268 per cent., at 200° of 1.554.

	SiO ₂ .	Fe ₂ O ₃ , Al ₂ O ₃ .	CaO.	MgO.	K ₂ O.	Na ₂ O.	H ₂ O.	Total.
I.	50.102	31.878	0.437	1.263	2.063	1.451	12.816	100.000
II.	45.751	34.461	0.642	trace	6.840	2.070	11.380	101.144

Dirty olive-green grains from Tschernowskoje (Gov. Nijni-Novgorod) gave analysis II; under pressure, the grains fall to yellowish-brown plates. At $100 - 115^{\circ}$ there is a loss of 2.816 per cent., at $250 - 260^{\circ}$ of 6.761. Dark green grains from Tagilj, of sp. gr. 2.8333, lost 3.1847 per cent. at 110° , and 3.8216 at $190 - 200^{\circ}$. In all the above cases the water was partially regained on exposing the material to the air at the ordinary temperature.

L. J. S.

[**Andalusite or Dumorierite in Argentine Granite.**] By PAUL JANNASCH (*Zeits. anorg. Chem.*, 1896, 12, 219—222). This mineral forms an amethyst powder, which sinters, but does not melt before the blowpipe, and becomes quite white when heated in a platinum crucible. Sp. gr. $= 3.255$ at 13.5° . Analysis gave

SiO ₂ .	B ₂ O ₃ .	TiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	CaO.	MgO.	K ₂ O.	Na ₂ O.	H ₂ O.
35.01	2.51	1.08	51.49	1.04	0.28	0.54	3.62	0.96	3.02

It also contains traces of lithium and organic matter.

E. C. R.

Epidote and Zoisite. By ERNST WEINSCHENK (*Zeits. Kryst. Min.*, 1896, 26, 156—177).—The composition of zoisite approaches to

$\text{H}_2\text{Ca}_4\text{Al}_6\text{Si}_6\text{O}_{26}$, and in epidote the molecule $\text{H}_2\text{Ca}_4\text{Fe}_6\text{Si}_6\text{O}_{26}$ is present in greater proportion, but in the author's klnozoisite there is actually less iron than in many zoisites. The similarity of the crystal angles of the two minerals is brought out by choosing the following parameters.

	<i>a</i>	:	<i>b</i>	:	<i>c</i> .
Zoisite....	2·9158	:	1	:	1·7900
Epidote...	2·8914	:	1	:	1·8057; $\beta = 81^\circ 3'$.

Groth's view, that zoisite is derived by lamellar twinning from epidote, can be made to agree with the cleavage of the two minerals, but not with their optical properties; while Brögger's view of their morphotropic relationship agrees with neither.

The name *klnozoisite* is proposed for the monosymmetric members of the zoisite-epidote group, which, in their low content of iron, agree with zoisite in composition, and which are optically positive and have a lower index of refraction and double refraction than ordinary epidote. Analysis I is of rose-red klnozoisite from the Goslerwand in Prägraten, Tyrol, where it occurs with diopside and potash felspar in a metamorphic rock at a serpentine contact; sp. gr. 3·3720; optical constants under A, positive, $\rho < v$, $a : c = 2^\circ$ in front; the crystal angles agree closely with those of ordinary epidote.

Epidote of a raspberry-red colour from Rothenkopf, Zillerthal, gave analysis II, the iron being here low for epidote; sp. gr. 3·3985; optical constants B.

Light green, columnar zoisite from the Gorner Glacier, near Zermatt, gave III (by A. Schwager), also trace of Cr_2O_3 ; sp. gr. 3·3720; optical constants C. Only the smallest crystals are optically uniform in character; others show irregularly bounded portions with optic axial angles of 90° and 50° in planes at right angles. Emerald-green zoisite from Kleinitz, near Prägraten, gave IV by Nagel, also Cr_2O_3 0·41; sp. gr. 3·3410.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO.	MnO.	CaO.	MgO.	H_2O .	Total.
I.	39·06	32·57	1·68	0·29	trace	24·53	—	2·01	100·14
II.	38·60	31·71	3·52	0·35	trace	24·22	—	1·95	100·35
III.	39·31	32·48	2·78	—	—	23·07	0·22	2·54	100·40
IV.	39·42	33·23	1·07	—	—	24·25	—	2·11	100·49

	α .	β .	γ .	$\gamma - \alpha$.	$2V_{\text{Na}}$.
A	1·7176	1·7195	1·7232	0·0056	$81^\circ 40'$
B	1·7238	1·7291	1·7343	0·0105	89 16
C	1·6973	1·7002	1·7061	0·0088	—

The author considers epidote and zoisite to be dimorphous; klnozoisite in the epidote series having the same composition as zoisite. The variation of the optical constants with the amount of iron in epidote is pointed out (compare this vol., ii, 371). L. J. S.

Glaucophane from Beaume. By LUIGI COLOMBA (*Zeits. Kryst. Min.*, 1896, **26**, 215; from *Atti Accad. Torino*, 1893-4, **29**, 404—423).

—Crystals of glaucophane from the schist and limestone at Beaumont in an upper valley of the Dora Riparia, Piedmont, gave, on analysis

SiO ₂ .	Al ₂ O ₃ .	FeO.	CaO.	MgO.	Na ₂ O.	K ₂ O.	Total.
56.48	14.60	9.36	2.12	8.27	8.29	trace	99.11

Ferric oxide is present. The primary glaucophane is often altered to chlorite, feldspar, and hæmatite.

L. J. S.

The Occurrence of Ammoniacal Nitrogen in Ancient Igneous Rocks. By HUGO ERDMANN (*Ber.*, 1896, **29**, 1710—1715).

—The author has found that a number of minerals which occur in ancient igneous rocks evolve ammonia when they are warmed with pure aqueous soda, and has estimated the amount of nitrogen present by converting the ammonia thus evolved into ammonium platinochloride and weighing the latter. Thus a mineral resembling polydymite, which occurs in pegmatite near the lake of Ladoga, and which contains oxide of uranium, niobic acid, titanitic acid, and certain of the rare earths, contains 0.028 per cent. of nitrogen evolved as ammonia whilst another mineral from the same locality, which resembles euxenite, contains 0.005 per cent. of nitrogen. A large number of other minerals from the north of Europe, such as ytter spar from Hitteroe, euxenite from Arendal, fergusonite from Arendal, gadolinite and æschynite from Hitteroe also contain similar quantities of nitrogen. Many of these minerals also contain helium, and the author believes that the latter, like the nitrogen which accompanies it, is present in the form of a compound, and not simply occluded, as supposed by Tilden (*Proc. Roy. Soc.*, 1896, **59**, 218).

Ammonia can also be obtained from carnallite, being most probably derived from an extinct sea fauna. It is possible that the nitrogen of the ancient rocks played an important part in the nourishment of plants in the earlier geological periods.

A. H.

Physiological Chemistry.

Composition of Human Fat. By CHARLES A. MITCHELL (*Analyst*, 1896, **21**, 171—173).—The author has investigated the composition of human fat taken from the kidneys.

Excepting the refractive index or the Valenta test, most of the recognised tests were employed. The conclusion is, that the acids of human fat consist of 70 per cent. of liquid acids, principally oleic acid, and 30 per cent. of solid acids, probably palmitic, with small amounts of stearic and myristic acids and traces of lower fatty acids.

L. DE K.

Decomposition of Amygdalin in the Animal System. By ERNEST GÉRARD (*J. Pharm.*, 1896, [6], **3**, 233—236).—The author has determined what digestive ferments react with amygdalin, and has also examined the action of the microbes of the stomach on the same

compound. The thoroughly washed pancreas of a rabbit gave no hydrocyanic acid, and no product which reduced Fehling's solution when kept in an incubator for 80 hours at 36—37°, with 40 c.c. of thymolised water holding 0.4 gram of pure amygdalin in solution. A portion of the small intestine taken 75 cm. from the pylorus when treated in the same way gave reactions of hydrocyanic acid, but no reduction with Fehling's solution. Parts of the intestine near to the cæcum gave the same results. The organisms of the stomach bring about a similar decomposition.

J. J. S.

Chemistry of Vegetable Physiology and Agriculture.

A new Oxydase or Soluble Oxidising Ferment of Vegetable Origin. By GABRIEL BERTRAND (*Compt. rend.*, 1896, 122, 1215—1217).—The darkening of the juices of beetroot, dahlia, or potato tubers, *Russula nigricans*, &c., is due to the oxidation of the tyrosin under the influence of a soluble ferment. The constitution of tyrosin does not, however, satisfy the conditions of oxidisability through the medium of laccase (*Abstr.*, 1895, i, 386, and this vol., i, 534), and experiment shows that it is not oxidised in presence of laccase. It follows that the phenomena observed must be due to some other ferment, to which the author gives the name *tyrosinase*. It is present not only in dahlia, beetroot, &c., but also in several fungi which contain no tyrosin, and can be extracted in the usual way, the best yield being obtained from certain fungi, and especially from some species of *Russula*. In the case of dahlia and beetroot, the ferment precipitated by alcohol shows but little activity. Direct experiment shows that laccase is without effect on various juices which oxidise readily in contact with tyrosinase, and that the extracts of *Russula*, &c., lose their fermenting power when heated at 100°.

The author gives the generic term *oxydase* to laccase, tyrosinase, and other oxidising ferments of vegetable origin.

Tyrosin can readily be obtained from dahlia roots by adding to the juice one-fourth of its volume of alcohol, filtering off the precipitated ferment as rapidly as possible, allowing the liquid to remain in well closed flasks until the residue is deposited, and then concentrating the mother liquor in a vacuum until the tyrosin crystallises.

C. H. B.

Assimilation of Nitrogen by Moulds. By KONSTANTIN A. PURIEWITSCH (*Chem. Centr.*, 1896, 1, 125; from *Ber. deut. bot. Ges.*, 13, 339—345).—*Aspergillus niger* and *Penicillium glaucum* did not grow in nutritive solutions (with cane sugar), free from combined nitrogen; ammonium nitrate was therefore added. Experiments, which lasted for two months, were made in 300—350 c.c. flasks containing 25 or 50 c.c. of nutritive solution. The flasks were sterilised, and the air which was passed through was absolutely free from nitrogen (*sic*). The results of the experiments showed assimi-

lation of nitrogen, and growth of the mycelium, almost in proportion to the amount of sugar supplied. It is, however, concluded that the amount of nitrogen assimilated by moulds is independent of the amount of dry matter they contain. N. H. J. M.

Mineral Nutrition of Plants. By W. BENECKE (*Chem. Centr.*, 1895, **1**, 792—793; from *Bot. Gen. H.*, **12**, 105—117).—In experiments with *Aspergillus*, *Penicillium*, and *Triticum*, it was found that magnesium is essential for the growth of the fungi and cannot, as stated by Naegeli and Loew, be replaced by calcium, strontium, or barium, by beryllium, as stated by Sestini, or by zinc, or cadmium. In opposition to Naegeli, Loew, and Winogradsky, it was found that rubidium or caesium cannot be substituted for potassium. Similar results were obtained with *Triticum*, for which calcium is also essential as well as sulphur, phosphorus, potassium, magnesium, and iron. Elements with low atomic weights (lithium, beryllium) and with high atomic weights (rubidium, caesium, zinc, cadmium, strontium, and barium) are poisonous. Elements with intermediate atomic weights are indifferent or necessary. This is on the assumption of amounts of the elements to a given surface of the organism, equal to the amounts of magnesium and potassium which are favourable; in a very dilute state, strongly poisonous substances, such as zinc sulphate (Raulin) and copper (Tschirch, this vol., ii, 328) may promote growth. (Compare Sestini, *Abstr.*, 1893, ii, 228). N. H. J. M.

Occurrence of Glutamine in Plants. By ERNST SCHULZE (*Ber.*, 1896, **29**, 1882—1884).—Glutamine can readily be separated from asparagine and tyrosine by crystallisation from water, whilst arginine can be removed by precipitation with phosphotungstic acid. It has been found in many plants, and appears to replace asparagine in many species of cruciferæ, in the ferns, and a few others. A. H.

Causes of Loss of Nitrogen in Decaying Organic Matter. By R. BURRI, E. HERFELDT and ALBERT STUTZER (*Chem. Centr.*, 1895, **1**, 501—502; from *J. Landw.*, 1894, **42**, 329—384; compare this vol., ii, 445).—In the preservation of stable manure the chief points are the control of the decomposition of urea and the absorption of ammonia. Loss of nitrogen in the free state will not take place as long as nitrification is suppressed, as for instance by compressing the manure and excluding air.

Bacteria which decompose urea ("ammonia bacteria") are generally present in stables and in all kinds of drainage, &c. Experiments made with the bacteria of liquid manure showed that urea was completely converted into volatile nitrogen compounds by them; they also converted about 22 per cent. of the nitrogen of peptone broth into volatile compounds, whilst pure cultures of "ammonia-bacteria" produced no ammonia from peptone broth. Urea was decomposed with great rapidity, uric acid less quickly, whilst hippuric acid was the least readily decomposed. But even the decomposition of hippuric acid is comparatively rapid when the length of time is considered during which manure is kept. The "ammonia bacteria" of liquid manure are

not affected by strong solutions of ammonium carbonate; the amount of sulphuric acid necessary to destroy them is 0.4 per cent.
N. H. J. M.

Analytical Chemistry.

Apparatus for Gas Analysis. III. By OTTO BLEIER (*Ber.*, 1896, 29, 1761—1762; compare this vol., ii, 70, 271).—A modification of the apparatus previously described. Close to the three-way tap a short capillary is fused, vertically upwards, it may either be closed with a rod, or connected with a stopcock when in use, this obviates the need of a three-way tap for each additional absorption pipette.

Carbonic oxide is absorbed in two vessels containing, respectively, cuprous chloride dissolved in ammonia, and hydrochloric acid.

A gas pipette for use instead of Hempel's double pipette is also described, it consists of a U-tube with a bulb near the extremity of each limb, the shorter of these is a capillary through which the gas is introduced and it carries a stop-cock at the junction of the capillary and bulb. The longer limb through which the bulbs are filled with the absorbent is closed by a rubber stopper between which and the bulb a short side-tube is fixed, attached to a caoutchouc balloon, which readily enables the capillary to be completely filled with liquid. This pipette is said to be cheaper than, and as efficient as Hempel's.

J. B. T.

Standardising Thiosulphate by Iodic acid. By E. RIEGLER (*Zeits. anal. Chem.*, 1896, 35, 308).—On treating a solution of thiosulphate with one of iodic acid, the following reaction occurs, $3\text{Na}_2\text{S}_2\text{O}_3 + 6\text{HIO}_3 = 3\text{Na}_2\text{S}_4\text{O}_6 + 5\text{NaIO}_3 + \text{NaI} + 3\text{H}_2\text{O}$, and the smallest excess of iodic acid liberates iodine. Since iodic acid can be obtained absolutely pure, can be completely dried over sulphuric acid, is not hygroscopic, and remains unchanged for a long time when dissolved in water, a N/10 solution, made by dissolving 17.6 grams to a litre, is a very serviceable reagent for standardising thiosulphate.

M. J. S.

Volumetric Estimation of Soluble Iodides. By E. RIEGLER (*Zeits. anal. Chem.*, 1896, 35, 305—307).—The following reaction occurs between iodic acid and an iodide; $6\text{HIO}_3 + 5\text{NaI} = 5\text{NaIO}_3 + 3\text{H}_2\text{O} + 6\text{I}$. By adding an excess of iodic acid, and titrating the excess by thiosulphate (see preceding abstract) after removal of the free iodine by light petroleum, the amount of iodide is ascertained. The solution of the iodide should not be stronger than 1 per cent. It is mixed with the iodic acid in a stoppered separator bulb, and shaken with two successive portions of light petroleum, after which starch is added and the excess of iodic acid titrated.

M. J. S.

Separation of Ozone from Hydrogen Peroxide, and Recognition of Ozone in the Atmosphere. By CARL ENGLER and W. WILD (*Ber.*, 1896, 29, 1940—1942).—It is found that hydrogen peroxide is immediately decomposed when its vapour is brought in contact with chromic acid, either in the solid state, or in concentrated solution; neither form of the oxidising agent, however, has any action on ozone, and it is possible by this means to completely deprive a mixture containing both substances, of the less stable constituent. The authors propose, therefore, to conduct air through glass beads and chromic acid, and test the gas with the ordinary ozone indicators. M. O. F.

Photometric Method for the Estimation of Lime and of Sulphuric acid. By J. I. D. HINDS (*Chem. News*, 1896, 73, 285—287, 299—300).—By precipitating dilute solutions of sulphuric acid and calcium chloride with solid barium chloride and ammonium oxalate respectively, mixing by pouring from glass to glass, and then observing the length of column required to render the flame of an ordinary candle just invisible; it has been found that with solutions containing from 0.0246 to 0.0055 per cent. of sulphuric acid, and those derived from 0.0333 to 0.0067 per cent. of calcium carbonate, a regular relationship exists between the depth of the column and the quantity of precipitate in suspension, and, consequently, that the former can be taken as a measure of the latter. A constant source of light would be required, and the personal error ascertained before applying the method to practical purposes. The author has made use of the method in the analysis of waters and of urine. D. A. L.

New Method of converting Sulphates into Chlorides. By PAUL JANNASCH (*Zeits. anorg. Chem.*, 1896, 12, 223—224).—The sulphates are fused with four to five times the quantity of boric anhydride, and heated in a platinum crucible until all the sulphuric acid is distilled off. The boric anhydride is then eliminated by means of alcoholic hydrogen chloride (this vol., ii, 576), or it may be treated directly with hydrogen chloride and methylic alcohol; 0.5 gram of sulphate, after 15—30 minutes' fusion, gave no reaction with barium chloride when dissolved in hydrochloric acid. E. C. R.

Action of Fused Polysulphides on Nitrogenous Organic Substances. By HEINRICH AUFSCHLÄGER (*Zeits. anal. Chem.*, 1896, 35, 314—318).—Nitrogenous organic substances, fused with about 2 parts of potassium polysulphide (*hepar sulphuris*, prepared by fusing together 2 parts of potassium carbonate and 1 part of roll sulphur was used) yield considerable amounts of thiocyanate. Upwards of 50 substances belonging to the most widely varied classes were found to give this reaction, which is suggested as a general one for nitrogenous substances; it is obtained even with potassium nitrate, when this is fused with a mixture of potassium sulphide and ignited potassium tartrate. To test for the thiocyanate formed, the cooled melt is dissolved in water and freed from sulphides by zinc sulphate, with addition of some sodium hydroxide. Copper sulphate is then added to the filtrate. Since sulphites are present, no other reducing

agent is required. The cuprous thiocyanate is filtered off, washed, and treated on the filter with ferric chloride. Some quantitative experiments with urea showed that about 10 per cent. of the theoretical yield was obtained.

M. J. S.

Citrate-Soluble Phosphoric acid. By OTTO REITMAIR (*Zeit. angew. Chem.*, 1896, 189—194).—An exhaustive examination of the citrate-solubility question. Wagner's process being purely empirical, great care must be taken to prepare his ammonium citrate solution exactly according to his directions.

Gerlack's solution containing citric acid only, gives in many cases the same results as Wagner's; its use is also more convenient, as it always gives a clear-filtering solution.

L. DE K.

Comparative Methods for estimating Citrate-Soluble Phosphoric acid in Basic Slags. By MAX PASSON (*Zeit. angew. Chem.*, 1896, 286—288).—Basic slags are now tested in Germany by simply estimating their citrate-soluble phosphoric acid; but complaint is being made of serious analytical differences.

The author has found that, when carefully following the conventional (Wagner's) directions, the amount of phosphoric acid dissolved by the ammonium-citrate solution is very constant. The analytical errors are, therefore, most likely caused during the further stages of the process. Excellent results are, however, obtained by the molybdate process if the temperature, during the precipitation, does not exceed 80—85°; if higher, there is a danger of silicic acid precipitating.

The accuracy of Wagner's process is shown by the result of 50 analyses of basic slag, each done in triplicate, using slightly different methods.

L. DE K.

Source of Error as to the presence of, and Estimation of, Boric acid. By GORGES (*J. Pharm.*, 1896, [6], 3, 346—347).—The author draws attention to the fact that the small quantity of boric acid, which is found in so many vegetable products on analysis, is probably introduced by some of the reagents used in the analysis, notably caustic soda and potash. Venable and Callison (*Chem. Zeit.*, 1890, 14, 167) found 0.06 per cent. of boric acid in caustic potash and soda sold as pure; and the author has confirmed their results.

J. J. S.

Decomposition of Silicates by pure Hydrofluoric acid. By ALFRED H. ALLEN (*Analyst*, 1896, 21, 87).—The author decomposes silicates in the following manner:—A mixture of commercial hydrofluoric acid with an equal bulk of sulphuric acid is placed in a large platinum crucible, and into this is placed a smaller crucible containing the silicate, moistened with a few drops of sulphuric acid. After covering the big crucible with a platinum dish filled with cold water, the arrangement is heated on an iron plate, when the acid volatilises, but again drops into the smaller crucible, and then decomposes the silicate. No fixed impurities are introduced into the latter, as is often the case when using commercial acid.

L. DE K.

Decomposition of Silicates by Boric acid. By PAUL JANNASCH and O. HEIDENRICH (*Zeits. anorg. Chem.*, 1896, 12, 208—218; compare this vol., ii, 219).—One gram of the finely powdered silicate is mixed in a platinum crucible with 3—6 times the quantity of dry powdered boric acid; in the case of fluorspar with eight times the quantity. The mixture is heated gently for 5—10 minutes, to drive off small quantities of water, then fused, and when it is in a state of quiet fusion, it is finally heated over the blowpipe. The fusion is usually finished in about 20—30 minutes. The red hot crucible is then placed on a porcelain triangle, and surrounded with cold water, in order to facilitate the removal of the fused contents. When cold, the fused mass is treated with water (100—150 c.c.) and concentrated hydrochloric acid (50 c.c.), and heated to boiling, when only a few flocks of silica should remain insoluble. The solution is then evaporated to dryness on the water bath; and when it commences to gelatinise is kept constantly stirred.

In order to separate the boric anhydride, the dried mass is treated with methyl alcoholic hydrogen chloride; the latter, which must be freshly prepared, is obtained by treating anhydrous methylic alcohol with dry hydrogen chloride, and then distilling off that portion of the product which comes over at 66—80°. The mixture is now warmed at 70—80° on the water bath, and, after two or three treatments with this liquid, is quite free from boric anhydride. The dry residual salt is heated at 110° for one hour, then lixiviated with hydrochloric acid and water, and the insoluble silica filtered off. The filtrate, which contains 0.5—2 per cent. of the silica, is again evaporated, and treated as above. The analysis of the residue is carried out by the usual methods.

The authors give the results of the analysis of several examples of silicates. E. C. R.

Behaviour of Minerals of the Andalusite Group towards Decomposing Agents. By PAUL JANNASCH (*Zeits. anorg. Chem.*, 1896, 12, 219—222).—The decomposition of silicates by means of boric anhydride (see preceding abstract) is of general application, and simpler and more expeditious than the ordinary methods. Disthene, a mineral of the andalusite group, is, however, only partially decomposed by boric anhydride. Minerals of the andalusite group generally behave in an abnormal manner towards decomposing agents, as the author has already pointed out in the case of a mineral allied to andalusite or dumortierite in Argentine granite. When heated with a mixture of calcium fluoride and hydrogen potassium sulphate on a platinum wire, it gives the green boron flame. The finely powdered mineral is only partially decomposed by a mixture of hydrofluoric and sulphuric acids. It can, however, be completely decomposed by ammonium fluoride. The ignited mineral is treated with ammonia, acidified with concentrated hydrofluoric acid evaporated to dryness, and fused for some time in a nickel crucible. The excess of ammonium fluoride is driven off at a higher temperature, and the remaining silicofluoride treated with dilute sulphuric acid. E. C. R.

see
errata
p. 1053

Estimation of Potassium. By J. H. VOGEL and H. HAEFCKE (*Landw. Versuchs-Stat.*, 1896, **47**, 97—255).—The shortened method for estimating potassium (*Fresenius Bd.*, **2**, 292) depends on the solubility of the platinochlorides of sodium, calcium, and magnesium, and the insolubility of potassium platinochloride in alcohol. The following average results were obtained by the author, and show the solubility of the potassium salt (at 17—19°) in alcohol of different strengths. Absolute alcohol, 1 : 35196 ; 95 per cent. alcohol, 1 : 31523 ; 80 per cent. alcohol, 1 : 20760. The results, which differ from Precht's (*Zeits. anal., Chem.*, **18**, 509), show that there is no danger of error when about 75 c.c. of absolute alcohol is used for washing, but repeated washing with hot alcohol seems hardly safe. Another weak point in the method is the weighing of the double salt on the filter, or (after redissolving) in a dish ; in drying on a filter there is a danger of partial decomposition of the salt, whilst when the double salt is redissolved in water and evaporated in a dish, large crystals are formed, which require prolonged heating at 130° before the weight becomes constant. These two objections are, however, overcome when the precipitate is collected and weighed in a perforated crucible, as at Halle.

With potassium solutions from which sulphates have been precipitated by barium chloride, errors are readily introduced, owing to the excess of barium chloride forming a platinochloride during evaporation. This is only partly washed out by alcohol, being mostly decomposed thereby ; and the barium chloride formed, which is insoluble in alcohol, remains on the filter with the potassium double salt.

In the method now described (for potassium salts), the substance (10 grams) is dissolved in boiling water (300 c.c.), the volume of the solution being made up to 500 c.c. When cold, 50 c.c. of this solution (= 1 gram of salt) is evaporated nearly to dryness in a platinum dish, and, when cold, treated with 20 c.c. of neutral ammonium carbonate (Schaffgot's) solution, to precipitate the lime and magnesia. After about 12 hours the whole is filtered through a small filter, and washed with 10—15 c.c. of the ammonium carbonate solution. The filtrate is evaporated to dryness in a platinum dish, after adding a very little strong sulphuric acid, and finally heated to redness. The residue is dissolved in hot water, filtered into a porcelain dish, and treated with hydrogen platinum chloride and a drop of dilute hydrogen chloride. It is then evaporated until there is no longer an odour of hydrochloric acid. The cold residue is well rubbed with a mixture of absolute alcohol (2 parts) and ether (1 part), filtered, after 15 minutes, through a well-glazed porcelain Gooch crucible, and washed with some of the mixture. After being dried, the platinum salt is reduced in hydrogen. An apparatus for this purpose is described with sketch. It consists of a Kipp's hydrogen apparatus, to which a Finkener's washing apparatus is attached. The hydrogen passes directly into the crucibles through well fitting covers. The reduction takes place at 240—250°, and too high a temperature must be avoided. After 10—15 minutes, heating is discontinued, but hydrogen is passed through the crucibles until they are cold.

The contents of the crucibles are then extracted with hot water, after which the crucibles are ignited and weighed.

In estimating potash in organic substances, it is not advisable to burn off the organic matter, as there may be a loss of potash by volatilisation. Good results were obtained by decomposing with sulphuric acid, as in Kjeldahl nitrogen determinations. The solution is suitably diluted to a definite bulk, one portion being reserved for estimating nitrogen, another for potash. In estimating potash, the solution is treated first with ammonium carbonate solution, the process being continued, as already described. The ammonium sulphate must, however, be volatilised with great care, using a very small flame; three or four hours will be required for this.

Very exact results are obtained, even when the final amount of platinum is relatively small.

It is of the greatest importance to employ very pure hydrogen platinum chloride, and full directions are given for preparing it. The preparation of the ammonium carbonate solution and of the asbestos for the Gooch crucible are also described. With regard to employing Kjeldahl solutions, it is shown that no potash is dissolved from the glass by prolonged contact with sulphuric acid. N. H. J. M.

Microchemical Reactions [of Barium, &c., and Silver]. By HERMANN TRAUBE (*Zeits. Kryst. Min.*, 1896, **26**, 188—189).—Streng (*Abstr.*, 1886, 487) has proposed to use tartar emetic as a reagent in testing for barium, but it is here pointed out that barium antimony tartrate is not to be distinguished from the strontium and lead salts; also at different temperatures differently hydrated and crystallised salts are obtained. Silver antimony tartrate is characteristic; and silver and lead are the only heavy metals which form crystallised salts. L. J. S.

Estimation of Zinc in Organic Salts. By GOTTFRIED VON RITTER (*Zeits. anal. Chem.*, 1896, **35**, 311—314).—The substance is moistened with concentrated nitric acid, the excess of acid evaporated at a low temperature, and the temperature gradually raised until the residue is burnt white, for which purpose the Lieben muffle is very suitable. Porcelain crucibles must be used, since platinum ones are attacked. M. J. S.

Double Compounds of Aniline and Metallic Salts. By J. L. C. SCHRÖDER VAN DER KOLK (*Zeits. anal. Chem.*, 1896, **35**, 297—305).—The crystalline precipitates obtained when many aqueous solutions of metallic salts are shaken with aniline or its aqueous solution can be employed for the micro-chemical detection of such metals. The author has determined the micro-crystallographic properties of aniline sulphate, nitrate and hydrochloride, of ferric and ferrous chlorides, of cobalt and nickel sulphates, nitrates and chlorides, and of the crystalline deposits obtained on treating solutions of these metallic salts with aniline, in the ordinary course of micro-chemical analysis. W. J. P.

Estimation of Tin. By CECIL J. BROOKS (*Chem. News*, 1896, **73**, 218—219).—Finding that stannous salts are more readily oxidised by bromine than by nitric acid, which only acts in strong solutions, and noting the volatility of stannic sulphide, the author recommends the following method for the estimation of tin. The solution is oxidised with bromine, and simultaneously treated with hot hydrogen sulphide solution, and also with the gas; the precipitate is filtered, washed, dissolved in hot ammonium sulphide, concentrated, oxidised with nitric acid, dried, ignited, and weighed. D. A. L.

Occurrence of Iodine in Waters. By MARCO T. LECCO (*Zeits. anal. Chem.*, 1896, **35**, 318—322).—The reaction with nitrous acid and carbon bisulphide is so sensitive that in waters containing no more than 0.1 milligram of iodine in a litre, it can be detected and colorimetrically estimated with sufficient exactness without previous concentration. In waters containing less than this amount, evaporation of a suitable volume to 100 c.c. and filtration before adding nitrite and sulphuric acid is the only preparation required.

By this means, iodine was detected in the mineral waters of Kurschumlija, Lomniza, and Vrnjze, four springs of the baths of Koviljatscha, and three of the wells of the new Belgrade water supply. Of 12 other Belgrade well waters, which, as a rule, are rich in chlorine, iodine could be detected in only one. The proportion of iodine shows some degree of parallelism with the amount of iron in the waters. M. J. S.

Estimation of Dissolved Oxygen. By GYSBERT ROMIJN (*Rec. Trav. Chim.*, 1896, **15**, 76—80; compare *Abstr.*, 1894, ii, 28).—The author describes a slightly modified form of the method previously given. Instead of using sodium hyposulphite as the reducing agent he employs a solution of manganese chloride (1 mol.) in water, to which Rochelle salt (2 mols.) and an excess of soda solution have been previously added. In the presence of dissolved oxygen the solution soon begins to turn brown, owing to the conversion of the manganous into a manganic salt, and if sufficient of the former be present, the whole of the dissolved oxygen will be used up in 10 minutes. The actual operation is carried out in a pipette, provided at either end with a single way glass stopcock, the upper cock carries a graduated cup, which contains exactly 1 c.c. to the mark. The pipette is filled with the water to be examined by Boot's method (*Abstr.*, 1894, ii, 484). The water is removed from the graduated tube, and this is then filled to the mark with a solution containing 120 milligrams of manganese chloride and 85 milligrams of potassium iodide per c.c. This solution is introduced into the pipette, the tube is rinsed out, the pipette shaken, and then 1 c.c. of a solution of 10 grams Rochelle salt in 12 c.c. water is introduced in exactly the same way, and, finally, 1 c.c. of a solution of caustic soda containing 0.1 gram per c.c. After shaking, the mixture is allowed to remain for six minutes, 1 c.c. of a 25 per cent. hydrochloric acid is added, and the coloured liquid is introduced into a flask, and the free iodine titrated. J. J. S.

Analysis of Anthracene. By HENRY BASSETT (*Chem. News*, 1896, **73**, 178—179).—The sample is oxidised in the usual way, using 15 grams of chromic acid; the next day, it is diluted with 400 c.c. of water, and after three hours is filtered, washed with cold water, and dried in a water oven. The quinone is transferred to a flask with 45 c.c. glacial acetic acid, 2.5 c.c. of chromic acid solution containing 1.5 gram of the acid, and 10 c.c. of nitric acid, sp. gr. 1.420, and boiled for an hour in a reflux apparatus. The following day, it is diluted with 400 c.c. of water, and after three hours is filtered and washed successively with water, boiling 1 per cent. alkali, and hot water. The quinone is dried at 100°, heated for 10 minutes on a water bath with 10 times its weight of pure, concentrated, hot, not fuming, sulphuric acid, left during the night to absorb water in a covered tray of water, diluted, filtered, washed again with water, boiling alkali, and hot water, then dried, weighed, &c. (compare *Abstr.*, 1895, ii, 332).
D. A. L.

Estimation of Phenol in Soaps and Disinfectants. By HEINRICH FRESENIUS and C. J. S. MAKIN (*Zeits. anal. Chem.*, 1896, **35**, 325—334).—The phenol in dilute aqueous solutions can be distilled with quantitative completeness and estimated in the distillate by Tóth's modification of Koppeschaar's method (*Abstr.*, 1877, i, 746; 1886, 744), which consists in the conversion of the phenol into tri-bromophenol by treatment with an excess of nascent bromine and titration of the unabsorbed bromine. The soap is dissolved in water, decomposed by a small excess of sulphuric acid, and the whole distilled with the help of a rapid current of steam, which considerably shortens the operation. Although traces of fatty acids pass over and consume bromine, their amount is so small that it may be neglected in practice. It, however, increases as the time of distillation is prolonged.

For disinfecting powders, which consist essentially of lime and carbolic acid, 0.5 gram is mixed with water in the distillation flask, and strongly acidified with hydrochloric acid before distilling.

The distillate is mixed in a stoppered flask with an excess of solution of sodium bromide and bromate. Hydrochloric acid is added, and the mixture shaken for 30 minutes. An excess of potassium iodide is then added, and, after 12 hours, the liberated iodine is titrated. Six atoms of bromine are consumed by one molecule of phenol.
M. J. S.

Estimation of Pentoses and Pentosanes by the Furfuraldehyde Distillation Process. By BERNHARD TOLLENS (*Zeit. angew. Chem.*, 1896, 194—195).—The author (this vol., ii, 393) recommended distilling the substance with hydrochloric acid, and precipitating the furfuraldehyde with phloroglucinol.

For calculating furfuraldehyde to pentosanes in general, the factor 1.84 is now proposed.
L. DE K.

Estimation of Sugars by Fehling's Solution. By JOHAN G. C. T. KJELDAHL (*Zeits. anal. Chem.*, 1896, **35**, 344—368; from *Meddelelser*

fra Carlsberg Laboratoriet, 4, 1).—The amount of cuprous oxide precipitated by identical quantities of sugar is largely influenced by the area of the surface of the liquid exposed to the air during the heating, as well as by the length of the boiling and the amount of copper solution employed. The following mode of procedure was, therefore, uniformly adopted. The requisite amount of Fehling's solution (usually 30 or 50 c.c., 15 c.c. being used only for very weak sugar solutions) was placed in a conical flask of 150 c.c. capacity. The measured quantity of sugar solution was added, and then water to exactly 100 c.c. The air was then excluded by passing hydrogen through the liquid until the end of the heating, and the flask was heated for exactly 20 minutes on the boiling water bath. The cuprous oxide was filtered off and weighed as usual, contact of air during this stage having far less influence than during the heating. The Fehling's solution was of the ordinary strength, but it is recommended that the three constituents should be kept apart until the time of use, when the solid tartrate should be dissolved in the soda solution. The exact proportions of tartrate and sodium hydroxide (65 grams per litre) must be adhered to.

The relation between the amount of copper reduced (Cu) and the sugar present (S) may now be expressed by the equation $Cu = aS - bS^2$, and the values of the factors a and b in the following table have been calculated from the experimental numbers by the method of least squares.

Volume of Fehling's solution.	Dextrose.		Levulose.		Galactose.		Arabinose.		Lactose, $C_{12}H_{22}O_{11} + H_2O$.		Maltose, $C_{12}H_{22}O_{11}$.	
	a .	$b \times 10^4$.	a .	$b \times 10^4$.	a .	$b \times 10^4$.	a .	$b \times 10^4$.	a .	$b \times 10^4$.	a .	$b \times 10^4$.
c.c.												
15	2·2810	70·162	1·9545	31·058	2·0089	46·851	2·2924	63·480	1·5031	16·922	1·3496	14·7850
30	2·3096	33·174	2·0654	22·750	2·0614	22·938	2·2506	25·192	1·5249	10·991	1·3143	6·9110
50	2·3300	20·490	2·1065	14·690	2·0937	14·626	2·2772	16·946	1·4296	4·1835	1·2322	3·0504
75	2·2786	12·333	2·0825	9·0112	2·0613	9·009	2·2695	11·615	1·3656	2·0120	—	—
100	2·2240	8·198	2·0658	6·3146	2·0087	5·871	2·1910	7·235	1·3340	1·3361	1·1305	1·0305

Extended tables for economising calculation are also furnished. When two sugars (for example, glucose and maltose) are present, the amount of copper they reduce jointly is expressed by the equation

$$p = \frac{px}{g} + \frac{py}{m},$$

where p is the total amount of copper reduced, g the corresponding amount of glucose taken from the table, m the corresponding amount of maltose, x and y the respective amounts of glucose and maltose present. By making two determinations with different volumes of Fehling's solution, and using in the second case a multiple (n) of the amount of sugar used in the first, a second

$$\text{equation, } P = \frac{P}{G}nx + \frac{P}{M}ny, \text{ can be obtained; whence}$$

$$x = \frac{nm - M}{n\left(\frac{m}{g} - \frac{M}{G}\right)} \text{ and } y = \frac{ng - G}{n\left(\frac{g}{m} - \frac{G}{M}\right)}.$$

In opposition to E. Fischer (Abstr., 1895, i, 6), the author has confirmed by fresh experiments his original statement that maltose is not changed by yeast mixed with thymol. He cannot, however, confirm Jais' assertion that maltose is not attacked when heated with 70—100 parts of N/40 hydrochloric acid. M. J. S.

Estimation of Glucose. By HENRI E. CAUSSE (*J. Pharm.*, 1896, 3, 433).—In consequence of the publication of Gerrard's method for the estimation of glucose (this vol., ii, 225), the author calls attention to the fact that he has already recommended a similar method (Abstr., 1889, 1036), employing potassium ferrocyanide instead of potassium cyanide. The author considers his own method the more delicate and trustworthy. J. J. S.

Examination of Honey. By ERNST BECKMANN (*Zeits. anal. Chem.*, 1896, 35, 263—284).—The products of the action of acids on starch are the substances most generally employed in the adulteration of honey. Since in the manufacture of starch syrup the hydrolysis is carried on only to the point where iodine gives a red reaction, erythrodextrin and amylo-dextrin are commonly present, and may be precipitated from the adulterated honey by the addition of methylic alcohol to its concentrated aqueous solution. Both dextrorotatory (flower) and lævorotatory (conifer) honeys are almost entirely soluble in methylic alcohol. Honey containing starch syrup is coloured red to violet by iodine solution, whereas pure honey gives no such colour. If the hydrolysis of the starch has been carried so far that iodine no longer gives any coloration, as in the manufacture of solid starch sugar, no precipitate is produced by methylic alcohol. Such starch sugar, however, still contains dextrinoid substances, which yield barium compounds insoluble in methylic alcohol, whilst the dextrans of natural honey give no precipitate, or, in the most unfavourable case, that of conifer honey, only about 2.5 per cent. For qualitative testing, 5 c.c. of a solution containing 20 grams of honey in 100 c.c. is shaken in a test tube with 2 c.c. of a 2 per cent. baryta solution and 17 c.c. of methylic alcohol, a comparative experiment with a pure honey, of about the same dextrin content, being advisable in doubtful cases. For quantitative estimation, the baryta precipitate should be collected on a Gooch filter, washed first with 10 c.c. of methylic alcohol, then with 10 c.c. of ether, and dried at 55—60°. The more rapidly the whole operation is performed the better. The results obtained with specially prepared mixtures of conifer honey with starch syrup and sugar show that the fact of adulteration can in all cases be detected, although they do not suffice for the calculation of its amount. In doubtful cases, a combination of the fermentation process, using a feebly acting yeast (beer yeast, or yeast of the Saatz type), by which the dextrans of natural honey are more completely fermented than those of starch products, may be resorted to.

The addition of molasses to honey is best detected by examining for raffinose with basic lead acetate (1 part of lead acetate, 3 parts of litharge, and 10 parts of water) and methylic alcohol. The honey solution should not be stronger than 25 per cent., and for 5 c.c. of the solution 2.5 grams of basic lead acetate and 22.5 c.c. of methylic alcohol are employed. Conifer honey gives 1 per cent., molasses 50—70 per cent., of lead precipitate.

M. J. S.

Detection of Formalin. By HENRY DROOP RICHMOND and L. KIDGELL BOSELEY (*Analyst*, 1896, **21**, 92—94).—The authors recommend Hehner's test as being the most delicate test for formylaldehyde in milk; far more sensitive even than their own test with diphenylamine (*Abstr.*, 1895, ii, 426).

The test is best applied by first diluting the sample with an equal bulk of water, and then carefully adding sulphuric acid of 90—95 per cent. strength. If formylaldehyde is present, a violet ring is formed where the two liquids meet.

L. DE K.

Detection of Formalin. By OTTO HEHNER (*Analyst*, 1896, **21**, 94—97).—The author finds that the blue colour developed when milk containing formylaldehyde is mixed with sulphuric acid is due to the presence of the casein.

To test wine or vinegar for this preservative, a drop of milk is added to the sample, and the mixture is poured carefully on to sulphuric acid contained in a test tube. A blue ring will then form if formylaldehyde is present.

L. DE K.

Estimation of Formaldehyde. By HARRY M. SMITH (*Analyst*, 1896, **21**, 148—150).—The sample is mixed with aqueous potash until the amount of alkali is about 10 per cent. Solution of potassium permanganate, 5.26 grams per litre, is now slowly run in until the green colour disappears rather slowly, and the liquid is then heated to 30° to cause the precipitate to subside. More permanganate is then added until an olive-green colour is obtained permanent for 15—20 seconds. At this stage, when the aldehyde has been converted into formic acid, 1 c.c. of the permanganate = 0.0015 gram of formaldehyde.

As a check, the mixture may now be boiled, and the adding of permanganate be continued until an emerald-green colour is obtained, lasting at least 10 minutes. At this stage, the formic acid now being completely converted into carbonic acid, 1 c.c. of the permanganate = 0.0075 of formaldehyde.

L. DE K.

Estimation of Tartar and Tartaric acid in Wine. By B. HAAS (*Zeits. anal. Chem.*, 1896, **35**, 376; from *Zeits. Nahrungsmittel-Unters. und Hygiene*, **2**, 97).—In each of two porcelain basins is placed 50 c.c. of the wine, the acidity of which has previously been ascertained, and to one of these portions is added enough potassium carbonate solution to neutralise exactly half the free acid present. Both liquids are now evaporated to 3—5 c.c., adding to the half neutralised one 2 c.c. of glacial acetic acid for each gram of tartaric

acid neutralised. 100 c.c. of 95 per cent. alcohol is gradually, and with stirring, added to each residue. After two hours, the precipitates are collected on a filter, washed with 95 per cent. alcohol, and then titrated with potash in hot aqueous solution, using litmus tincture as indicator. The unneutralised portion gives the tartar, and the difference between the two the tartaric acid. M. J. S.

Composition and Analysis of Commercial Cream of Tartar. By ALFRED H. ALLEN (*Analyst*, 1896, 21, 174—180, 209).—The author, after criticising the B.P. tests for cream of tartar, finally proposes the following process. 1.881 gram (or in important cases double this quantity) of the *dried* sample is dissolved in hot water and titrated with N/10 alkali and phenolphthaleïn. In absence of other acid substances, 1 c.c. of the alkali represents 1 per cent. of potassium hydrogen tartrate. The same amount is ignited, but without attempting to burn off the carbon. The mass is boiled with water, and the filtrate is titrated with N/10 hydrochloric acid and methyl-orange. When dealing with a pure sample, the number of c.c. of acid will correspond exactly with the c.c. of alkali used in the first experiment, but each c.c. of deficiency represents 0.36 per cent. of calcium sulphate, or 0.72 per cent. of potassium hydrogen sulphate. Any excess points to the presence of potassium tartrate, each c.c. representing 0.60 of this compound. The sulphate may be, of course, estimated by means of barium chloride.

The insoluble matter is ignited to burn off the carbon, and the ash is dissolved in 20 c.c. of N/10 acid, any insoluble residue, such as sand, or barium sulphate being filtered off, and the liquid titrated with N/10 alkali and methyl-orange. Each c.c. corresponds with 0.5 per cent. of calcium tartrate or 0.3 per cent. of calcium sulphate.

L. DE K.

Titration of Quinine. By ALFRED H. ALLEN (*Analyst*, 1896, 21, 85—87).—The author points out that commercial quinine sulphate is neutral towards brazil wood, logwood, and cochineal, distinctly alkaline to litmus, and strongly so to methyl-orange.

When titrating with the last indicator, double the amount of standard acid will be required.

L. DE K.

A New Reaction for Antipyrine or for Quinine. By C. CARREZ (*J. Pharm.*, 1896, [6], 3, 253—255).—When a mixture of equal parts of antipyrine and quinine is treated with bromine water and then with ammonia, a red coloration is obtained which is given by neither of the alkaloids separately. This red compound, *quinerythroprine*, is best extracted from its ammoniacal solution by means of chloroform. It is only slightly soluble in pure water, but readily in acidified water. With acids, it gives an orange-rose colour, and with alkalis a violet-rose. The reaction can be made use of in testing for quinine or for antipyrine, and is also applicable for urine testing.

J. J. S.

General and Physical Chemistry.

Spectrum of Phosphorus in Fused Salts and certain Metallurgical Products. By ARNAUD DE GRAMONT (*Compt. rend.*, 1896, 122, 1534—1536).—When fused phosphates are subjected to the action of a condensed spark (next abstract), a line spectrum of phosphorus is obtained superior to that seen in a Plücker's tube. With sodium or potassium phosphate, the following lines are observed, and are bright and distinct except where otherwise indicated: 6506 (diffuse), 6458, 6088, 6042, 6034·5, 6025, 5498·5, 5462 (feeble), 5453 (feeble), 5423·5, 5409, 5385, 5340, 5311, 5292, 5250, 4968 (diffuse), 4941, 4603, 4588·5. The lines most easily recognised are the triplet, 6042-6034·5-6025, in the red, and the doublet, 4603-4588·5, in the blue. This spectrum is seen in many metallurgical products containing phosphorus—and especially in copper phosphides when these are examined in the manner previously described (*Abstr.*, 1895, ii, 470). The brightness of the lines diminishes with the proportion of phosphorus, and the characteristic triplet in the red becomes invisible in metals when the percentage falls to between 1·0 and 0·1 of phosphorus.

C. H. B.

Dissociation Spectra of Fused Salts of Alkali Metals. By ARNAUD DE GRAMONT (*Compt. rend.*, 1896, 122, 1411—1413).—Salts of alkali metals offer special advantages in the study of the line spectra of the non-metals by the action of a highly condensed spark on the fused salt, because of the comparative simplicity of the spectrum of the metal. In the case of these salts, the spectrum with a highly condensed spark differs considerably from that obtained with the spark and the metal itself, or with the fused salt and a non-condensed spark. The carbonates, although dissociated with difficulty, give the spectra of the metals in their simplest form, and no lines of carbon are observed. Fluorides also show relatively little tendency to dissociate, but other salts, such as chlorides, bromides, and iodides, decompose readily.

Sodium salts show the three intense doublets—6160-6154, 5895-5889, 5687·5-5682, whilst all other lines are feeble, though 5675, 5669, 5155, 5152, and a broad diffuse band, 4983-4978, are recognisable.

Potassium salts show 7698, 7665, 6939, 6911, 6308, 6245·5, 6117·5, 5832, 5811, 5801, 5783, 5360, 5344, 5340, 5323, 5113, 5099, 4828, 4389, 4309, 4264, 4223, 4185, 4045, although the first two are difficult to see.

Lithium salts show 6706, 6103, 4972, 4603, 4273, 4132, and the small number of lines shown by this metal makes its salts particularly suitable for investigations of the spectra of the non-metals.

C. H. B.

"Convection" Currents. By FRANZ RICHARZ and CARL LONNES (*Zeit. physikal. Chem.*, 1896, 20, 145—158).—The authors endeavor

voured to determine the cause of the currents through acidified water, which occur with electromotive forces insufficient for the decomposition of the water. As hydrogen peroxide is produced with a stronger E.M.F., they considered it probable that a similar formation might also be the cause of the convection currents. Preliminary experiments showed that the peroxide is not produced when the platinum and gold electrodes employed are placed in acidified water, although they contained occluded hydrogen. During the passage of the convection currents, however, hydrogen peroxide is formed, but the quantity produced is insufficient to account for the current, neither is it in any way proportional to the current strength as measured by a silver voltameter. The peroxide is not produced with an E.M.F. below that of one Daniell's cell. Experiments with solutions of sodium hydroxide showed that sodium peroxide is formed at the cathode, but no barium peroxide is produced in solutions of barium hydroxide.

L. M. J.

Electromotive Force and Partition Equilibrium. By ALFRED H. BUCHERER (*Zeit. physikal. Chem.*, 1896, **20**, 328—330).—The author claims to have made several of the observations recorded by Luther (this vol., ii, 461), and to have drawn similar conclusions at an earlier date, his results having appeared in the *Electrochem. Zeit.* for January, and in the *Chemiker Zeitung* of January 4th.

L. M. J.

The Potential Differences at the Surface of Contact of Dilute Solutions. By OLIN FREEMAN TOWER (*Zeit. physikal. Chem.*, 1896, **20**, 198—206).—By calculating the potential difference between $\text{HNO}_3(1) - \text{HNO}_3(2)$ by means of Nernst's formula, and subtracting this from the E.M.F. of the galvanic chain $\text{MnO}_2 - \text{HNO}_3(1) - \text{HNO}_3(2) - \text{MnO}_2$, the sum of the potential differences between the acids and electrodes can be obtained. Also, by means of approximations in Planck's formula, the potential differences, $\text{HNO}_3(1) - \text{KCl}$ and $\text{KCl} - \text{HNO}_3(2)$, can be ascertained, and, by adding these to the previous results, the E.M.F. of the chain $\text{MnO}_2 - \text{HNO}_3(1) - \text{KCl} - \text{HNO}_3(2) - \text{MnO}_2$ can be calculated. This was done with chains in which not only potassium chloride but also sodium chloride and sodium nitrate at concentration 1 to 1/128 normal were employed, and in all cases there was satisfactory agreement between the calculated numbers and the observed E.M.F. In all cases the presence of the salt solution diminished the negative potential difference between the acids, and so increased the E.M.F. of the cell; this effect increasing with the concentration of the salt. In the case of similar experiments with zinc electrodes in solutions of zinc nitrate, the agreement was not so satisfactory, possibly owing to Planck's formula being available only for univalent ions, for which the previous experiments prove its validity.

L. M. J.

Electrolytic Decomposition of Fused Zinc Chloride. By RICHARD LORENZ (*Zeit. anorg. Chem.*, 1896, **12**, 272—276).—A determination of the voltage required to decompose pure fused zinc chloride gives the number 1.49 to 1.50 volts. Three different strengths

of current were employed in the experiments, and the results obtained from each agree closely. The theoretical voltage = 2.1, but it must be remembered that the temperature at which the experiments were carried out was 500—600°. E. C. R.

Influence of Ethylic Alcohol on the Electrolytic Dissociation of Water. By RICHARD LÖWENHERZ (*Zeit. physikal. Chem.*, 1896, **20**, 283—302).—The author has re-determined the electrolytic dissociation of water by Ostwald's method (Abstr., 1893, ii, 365), using, also, a correction for the difference of potential between acid and base as indicated by Nernst (Abstr., 1894, ii, 343).

The apparatus employed was similar to that described by Smale (Abstr., 1894, ii, 436). Owing to the variations, the values for the E.M.F. could not be considered accurate to the extent of more than 1/1000 volt. Solutions of acid and alkali of N/10 and N/100 were employed, and the values for the dissociation thus obtained were 1.075×10^{-7} , 1.187×10^{-7} , and 1.134×10^{-7} , numbers agreeing well with the results of Wijs, Arrhenius and Shields, and Kohlrausch; on the addition of ethylic alcohol, however, the dissociation was found to decrease, the following values being obtained.

7.4 p. c.	— 0.92×10^{-7} .	86.6 p. c.	— 0.0574×10^{-7} .
24.0 „	— 0.69×10^{-7} .	92.6 „	— 0.0270×10^{-7} .
41.8 „	— 0.470×10^{-7} .	97.4 „	— 0.0096×10^{-7} .
64.8 „	— 0.201×10^{-7} .	99.8 „	— 0.00288×10^{-7} .

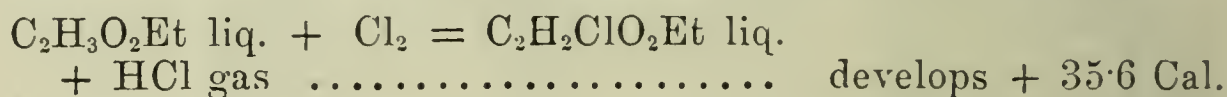
The results indicate that in solutions of little water in much alcohol, the water obeys the law of feebly dissociated electrolytes, that is, the concentration of the ions is proportional to the square root of the water concentration. In stronger solutions, however, the dissociation is greater than indicated by the law, and the water is shown to have a stronger dissociating influence on its own molecules than the ethylic alcohol has. L. M. J.

New Method of determining Freezing Points. By MEJER WILDERMANN (*Proc. Roy. Soc.*, 1896, **59**, 251—254).—The author discusses the best means of determining freezing points in dilute as well as in concentrated, solutions. The proper arrangement of equilibrium in the heterogeneous system is first mathematically considered, and the proper treatment of the instrument used for measuring temperature is explained. H. C.

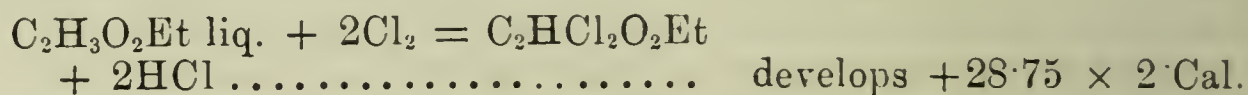
Freezing Point Depressions in very Dilute Solutions. By RICHARD ABEGG (*Zeit. physikal. Chem.*, 1896, **20**, 207—233).—The freezing points of a number of solutions were determined, a full account of the apparatus and method being given in the paper. The preliminary experiments indicated the necessity of maintaining a constant rate of stirring, as variations caused a marked difference in the Newtonian constant k of the equation $dt = k(t_0 - t)/dz$ (where t_0 = convergence temperature, Abstr., 1895, ii, 155). Experiments with potassium chloride and cane sugar further show that the value of k is not constant for different solutions, so that the conclusions of

Wildermann (this vol., ii, 291) are not valid. The value of t_0 was in all cases only slightly lower ($<0.5^\circ$) than the actual freezing point of the solution, so that the error due to this difference, which was found to be about 2 per cent. per degree, cannot exceed 1 per cent., and the results are therefore not further corrected. Several series of experiments were performed with very dilute solutions of each compound, and the mean of each series taken. The values for the molecular depression thus obtained are: cane sugar, 1.89, 1.82, 1.89, 1.845; alcohol, 1.78, 1.79; urea, 1.86, 1.875; dextrose, 1.78, 1.84; tartaric acid, 1.83, 1.84. In the case of electrolytes (potassium chloride, sodium chloride, and potassium sulphate) the dissociation was calculated with the value 1.85 for the molecular depression, and the results obtained are compared with those derived from the conductivity. The agreement is satisfactory, but the cryoscopic values are generally the higher. L. M. J.

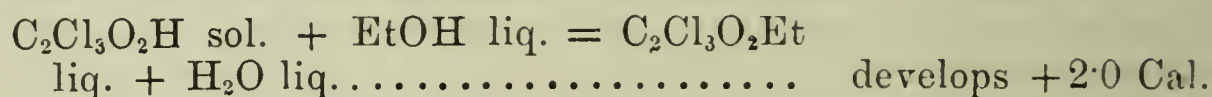
Ethylic Salts of the Chloracetic acids. By PAUL RIVALS (*Compt. rend.*, 1896, **122**, 1489—1491).—*Ethylic Chloracetate*.—Heat of combustion (1 gram) +4029.1 Cal.; molecular heat of combustion at constant volume +493.56 Cal., at constant pressure +493.85 Cal.; heat of formation of the liquid from its elements, +129.75 Cal.



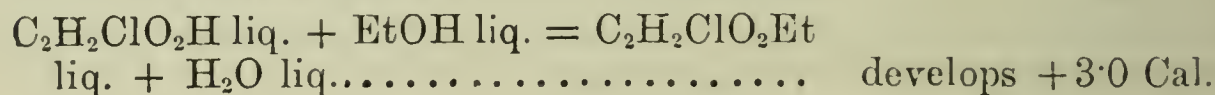
Ethylic Dichloracetate.—Heat of combustion (1 gram) +2951 Cal.; molecular heat of combustion at constant volume and at constant pressure, +463.31 Cal.; heat of formation of the liquid from its elements, +130.7 Cal.



Ethylic Trichloracetate.—The heat of formation of this compound was determined indirectly by the action of trichloroacetic chloride on ethylic alcohol.



From the data already given it follows that

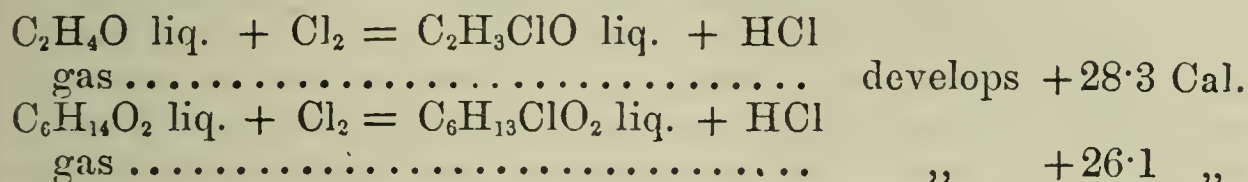


The substitution of chlorine for hydrogen in acetic acid increases the energy of the acid function, and the chloracetic acids in this respect resemble formic acid and the more energetic organic acids (compare Abstr., 1895, ii, 254). C. H. B.

Acetal and Monochloroacetal. By PAUL RIVALS (*Compt. rend.*, 1896, **122**, 1488—1489).—*Acetal*.—Heat of combustion (1 gram), +7802 Cal.; molecular heat of combustion at constant volume, +920.7 Cal. at constant pressure, +923.2 Cal.; heat of formation of the liquid from its elements, +125.6 Cal.

Chloracetal.—Heat of combustion (1 gram), +5825 Cal.; molecular heat of combustion at constant volume, +888.31 Cal., at constant pressure, +889.70 Cal.; heat of formation of the liquid from its elements +129.7 Cal.

From these and previous results (compare Abstr., 1895, ii, 306) it follows that



and hence the heat of formation of chloracetal from monochloraldehyde and alcohol (−4.0 Cal.) is practically equal to the heat of formation of acetal from aldehyde (−2.3 Cal.). In other words the substitution of chlorine for hydrogen in aldehyde has no appreciable influence on the heat of formation of the ethylic derivatives of aldehyde.
C. H. B.

Heat of Vaporisation of Formic acid. By DOROTHY MARSHALL (*Compt. rend.*, 1896, 122, 1333—1335).—The heat of vaporisation of carefully purified formic acid was determined by the method of comparison (this vol., ii, 349), the other liquid being benzene. The value obtained is 120.36, which agrees with that obtained by Favre and Silbermann, 120.7. The quotient of the molecular heat of vaporisation by the absolute temperature ML/T , is 14.7, which is identical with the corresponding number for acetic acid.

The value of the latent heat of vaporisation of formic acid, calculated by Raoult's formula, from his observations on its vapour tension, is 120.9.
C. H. B.

Heat of Dissolution of Sodium Chloride. By ED. VON STACKELBERG (*Zeit. physikal. Chem.*, 1896, 20, 159—167).—From the experimental data of Winkelmann and Staub, tables are derived and curves constructed for (1) the heat of dissolution of sodium chloride at various concentrations; (2) the total heat of dissolution up to these concentrations, at temperatures 18° and 0°. The curves (1) cut the concentration 35.5 per cent. ordinate at about +1.2 Cals. and −4 Cals., so that at 0° the heat of dissolution in a concentrated solution is negative, but positive at 18°, results which agree with the observations of Braun and Deventer. The curves, moreover, cut at about 20 per cent., so that it follows that the temperature coefficient of the heat of dissolution is negative in dilute solutions, but becomes positive at higher concentrations, a result which is also shown to obtain with solution of sodium nitrate, potassium nitrate, potassium chloride, and ammonium chloride. Corresponding with the change from the positive to the negative value in curve (1), the curve for the total heat of dissolution at 0° reaches a maximum at about 25 per cent., after which it decreases.
L. M. J.

Thermochemistry of Uranium Compounds. By J. ALOY (*Compt. rend.*, 1896, 122, 1541—1543).—Heats of Dissolution at

18—20°.—Uranium nitrate, $\text{UO}_2(\text{NO}_3)_2 + 3\text{H}_2\text{O}$, -3.7 Cal.; sulphate, $\text{UO}_2\text{SO}_4 + 3\text{H}_2\text{O}$, $+5.1$ Cal.; chloride, $\text{UO}_2\text{Cl}_2 + \text{H}_2\text{O}$, $+6.05$ Cal.; chromate, $\text{UO}_2\text{CrO}_4 + 5\frac{1}{2}\text{H}_2\text{O}$, -6.3 Cal.; acetate, $\text{UO}_2(\text{C}_2\text{H}_3\text{O}_2)_2 + 2\text{H}_2\text{O}$, -4.3 Cal.; uranyl potassium chloride, $\text{UO}_2\text{Cl}_2 \cdot 2\text{KCl} + 2\text{H}_2\text{O}$, $+2.0$ Cal.; uranyl ammonium acetate, $\text{UO}_2(\text{C}_2\text{H}_3\text{O}_2)_2 + \text{NH}_4 \cdot \text{C}_2\text{H}_3\text{O}_2 + 6\text{H}_2\text{O}$, -3.8 Cal.

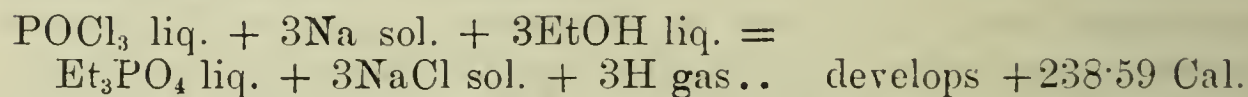
Uranyl hydroxide, $\text{UO}_2(\text{OH})_2$, was prepared by evaporating a solution of the nitrate in absolute alcohol (Malaguti), and by heating the nitrate on a sand bath (Berzelius). Both products had the same composition, and gave the same thermal disturbances when dissolved in acids. The heats of neutralisation with two equivalents of various acids at 19°, were as follows: Hydrochloric, $+8.4$ Cal.; hydrobromic, $+8.8$ Cal.; nitric, $+8.4$ Cal.; sulphuric, $+9.5$ Cal.; acetic, $+7.5$ Cal.

The heats of formation of the uranyl salts from the hydroxide are lower than those of zinc and lead salts, and approximate to those of the ferric and chromic salts. C. H. B.

Measurement of the Heat of Formation of Triethylic Phosphate by the Action of Phosphorus Oxychloride on Sodium Ethoxide. By J. CAVALIER (*Compt. rend.*, 1896, **122**, 1486—1488).—When phosphorus oxychloride is added to a solution of sodium in excess of dry alcohol, there is an immediate energetic action with formation of sodium chloride and triethylic phosphate. The following measurements were made.

Heat of dissolution of sodium in alcohol ($\text{Na} + 12\text{EtOH}$).....	$+42.88$ Cal.
POCl_3 liq. $+ 3\text{EtONa}$ diss. $= \text{Et}_3\text{PO}_4$	
diss. $+ 3\text{NaCl}$ pptd..... develops	$+109.77$ „
Heat of dissolution of triethylic phosphate in alcohol	-0.20 „

From these results, it follows that



and combining this result with the known data involved,



a result comparable with that obtained in the case of alcohol and acetic acid. C. H. B.

Diffusion of Metals. By WILLIAM CHANDLER ROBERTS-AUSTEN (*Phil. Trans.*, 1896, **187**, 383—415. “Bakerian Lecture”).—Very little attention has been given hitherto to the consideration of the molecular movements which enable two or more molten metals to mix spontaneously and form a truly homogeneous fluid mass. Some experiments on the mobility of gold and silver in molten lead, made by the author about 14 years ago and communicated to the Chemical Section of the British Association in 1883, appear to be the first ever

made with the direct object of investigating the diffusion of molten metals and alloys, other than those of mercury which are liquid at the ordinary temperature. The research has been resumed during the past two years, and the diffusion of various metals in molten lead, bismuth, and tin has been carefully investigated.

The tubes which contain the molten metal are arranged in an air bath with double walls, which can be readily maintained at definite temperatures, the measurement of the temperature being effected by the aid of thermo-junctions. The tubes are carefully kept hotter at the top than at the bottom, so as to avoid convection currents from the bottom of the tube. At the end of a given period, varying from six hours to seven days, the diffusion tubes were removed, cooled from below, carefully measured, and then cut into transverse numbered sections, the metallic contents of each section being weighed and analysed.

According to Fick, who applied Fourier's theory of thermal conduction to the phenomena of material diffusion generally, the movement in linear diffusion may be expressed by the differential equation—

$$dv/dt = k(d^2v/dx^2).$$

In this equation, x represents the distance in the direction in which the diffusion takes place; v is the degree of concentration of the diffusing metal, and t the time; k is the diffusion constant, that is the number which expresses the quantity of the metal, in grams, diffusing through unit area (1 sq. cm.) in unit time (one day), when unit difference of concentration (in grams per c.c.) is maintained between the two sides of a layer 1 cm. thick. The unit of diffusivity has the dimensions $[L^2T^{-1}]$, so that diffusion constants may be expressed in square centimetres per day. The constant has a definite value for each pair of metals (that is for the diffusing metal and its solvent) at a particular temperature, and the object of the experiments on diffusion is to determine this value. It was found that the tables calculated by Stefan for the diffusion of salts apply in the present instance. By the help of these tables, the diffusion constant could be determined when the distribution of the dissolved diffusing metal was known.

In the following table, the results of the more recent experiments are recorded.

It will be seen that gold diffuses more rapidly in bismuth and in tin than it does in the heavier metal lead. It has also been observed that platinum diffuses faster in bismuth than in lead. The diffusion of platinum and of gold is increased in about equal ratio by the substitution of bismuth for lead as a solvent. On the other hand, platinum diffuses much more slowly in lead than gold does, although their atomic weights and their densities do not greatly differ. Rhodium, another metal of the platinum group, diffuses in lead nearly as fast as gold does; but if allowance be made for the smaller atomic weight, it will be found to agree fairly well with platinum. This would point to the conclusion that the platinum metals are molecularly more complex than either gold or silver, as a complex

molecule exerts less osmotic pressure and diffuses more slowly than a comparatively simple one.

Diffusing metal.	Solvent.	Temperature.	k in square centimetres.	
			Per diem.	Per second.
Gold	Lead.....	492°	3·00	$3·47 \times 10^{-5}$
„	„	492	3·07	3·55 „
Platinum	„	492	1·69	1·96 „
„	„	492	1·69	1·96 „
Gold	„	555	3·19	3·69 „
„	Bismuth ...	555	4·52	5·23 „
„	Tin	555	4·65	5·38 „
Silver	„	555	4·14	4·79 „
Lead	„	555	3·18	3·68 „
Gold	Lead	550	3·185	3·69 „
Rhodium	„	550	3·035	3·51 „

The diffusion of metals is not increased nearly so rapidly by a rise in temperature of 50° as the ordinary aqueous diffusion of salts is. It may be that the molecules of the diffusing substance are not so liable to disruption by a rise in temperature.

A number of experiments were made on the diffusion, at ordinary temperature, of gold in mercury, the value found for k at 11° being 0·72 sq. cm. per day. From experiments by Guthrie (1883) on the diffusion of zinc, tin, lead, sodium, and potassium in mercury, the following values for k , in square centimetres per day, were calculated.

Tin in mercury at about 15°.....	1·22
Lead „ „	1·0
Zinc „ „	1·0
Sodium „ „	0·45
Potassium in mercury at about 15°.....	0·40

The experiments described in the first part of this paper naturally suggested the inquiry whether gold would still permeate lead if the temperature were maintained at a point far below the melting point of lead. The attempt was first made to ascertain whether diffusion of gold in solid lead could be measured at 250°, that is 75° below the melting point of lead. Thin plates of gold were fused on to the end of cylindrical rods of lead, 14 mm. in diameter and 7 cm. long. Such cylinders were maintained at 250° for 31 days in a little iron chamber lined with asbestos. They were then measured and cut up into sections, and the amount of precious metal in the respective sections was determined by analysis. In each case gold was found throughout the entire length of the cylinder, and the diffusivity was found in one case to be 0·023 and in another 0·03 sq. cm. per diem.

Similar results were obtained in experiments at 200° , which lasted only 10 days, the diffusivity found being 0.007 and 0.008.

As the above experiments were conducted at temperatures above the melting point of the eutectic alloy of gold and lead (200°), care was taken to ascertain whether gold would diffuse in solid lead well below this point, and for this purpose the temperature chosen was 165° . The diffusivity could still be determined, and was ascertained to be 0.005 and 0.004 sq. cm. per diem in two experiments. Even at 100° the diffusion of gold in solid lead can still be determined, the diffusivity being about 0.00002, or only 1/100,000th of that which occurs in liquid lead.

Experiments were made on the diffusion of gold in solid silver at 800° , this being 160° below the melting point of silver, and 50° below that of the eutectic alloy of gold and silver. The temperature was intermittent, so that the true diffusivity could not be taken, but the diffusivity is of the same order as that of gold in lead at 200° . It would appear, therefore, that the melting points of the metals have a dominating influence on the resistance offered to diffusion.

H. C.

Relation between Osmotic Pressure and the Law of Active Masses. By ALEXANDR A. JAKOWKIN (*Zeit. physikal. Chem.*, 1896, 20, 321—327).—Starting with Nernst's law that the active mass of a solvent is at constant temperature proportional to its vapour pressure (Abstr., 1893, ii, 367), the equation $x(a - 1 + x) = kv(1 + x)$ leads to $c/C\left(a - \frac{C - c}{C}\right) = kv(C - c)/C$, where C is the vapour pressure of the solvent and c that of the solution. From this, by neglecting the coefficient c/C , which is nearly equal to unity, the equation $PV(1 + kv) = RT$ is derived for the osmotic pressure. It is hence not exactly equal to the gas pressure, but as kv is generally very small, it is approximately so.

L. M. J.

The Course of Chemical Reactions in Gases. By ERNST COHEN (*Zeit. physikal. Chem.*, 1896, 20, 303—306).—Storch, in a paper on this subject (this vol., ii, 296), came to the conclusion that the reaction for the formation of water from the mixed gases is not a trimolecular reaction, but one of the 9th order, obtaining a constant value for k in the equation $dc/dt = kc^9$. The author does not consider that the results justify the conclusion owing to the enormous influence of the walls of the containing vessels on the reaction velocities of gases. In the decomposition of arsenic trihydride, a constant k is not obtained until the walls of the vessel become completely covered with arsenic. During the long heating in Storch's experiments, the author considers that the velocity constant would certainly alter, so that the fact that the equation of the 9th order leads to a constant value indicates that the reaction itself cannot be of this order.

L. M. J.

The Influence of Pressure on Reaction Velocities. By VICTOR ROTHMUND (*Zeit. physikal. Chem.*, 1896, 20, 168—179).—The experiments of Röntgen showed that at high pressures the velocity of

inversion of cane sugar is diminished, a result which he ascribed to a decrease in the dissociation of the acid. This conclusion was, however, contested by Tammann (Abstr., 1894, ii, 410). Moreover, high pressures were proved by Fanjung (Abstr., 1894, ii, 438) to cause an increase in the conductivity, although the number of ions is only very slightly altered. The author has, therefore, re-examined the effect of pressure on the velocity of inversion of cane sugar, and obtained results in complete agreement with those of Röntgen (*Ann. Phys. Chem.*, 1892, **45**, 98), the velocity decreasing by about 1 per cent. per 100 atmospheres. In order to see whether this effect is really due to a change in the number of ions, the effect of pressure on the velocity of hydrolysis of methylic and ethylic acetates was determined, hydrochloric acid of the same strength as before being employed. In this case, however, the velocity was found to *increase* to the extent of about 3.7 per cent. per 100 atmospheres. The velocity was found to be equally well represented by a linear or exponential formula, and no change was obtained when the concentration of the acid was altered, or by the use of nitric acid. From this, the author concludes that the effects cannot be due to alterations in the dissociation. If the presence of "active" and "inactive" molecules be assumed, of which only the former can undergo decomposition, the results may be explained by the effect of pressure on the equilibrium between the active and inactive molecules (Abstr., 1889, 1103). L. M. J.

New Relations between the Atomic Weights of the Elements.

By M. CAREY LEA (*Zeit. anorg. Chem.*, 1896, **12**, 249—252).—In a previous paper on the colour of atoms, ions, and molecules (Abstr., 1895, ii, 441) cerium was classed with the eleven elements whose ions are in some cases coloured, in others colourless. The author now classes cerium amongst the elements having coloured ions: the ion of the ceri-compounds is without doubt coloured; the ion of the cero-compounds appeared to be colourless, but these compounds have a faint red colour. Gold was placed in the former paper amongst the series which gives only coloured ions; there is some doubt, however, with regard to the auro-compounds. The oxides and haloïds are coloured, but are insoluble, and therefore the colour of the ions cannot be determined. Aurous chloride, however, dissolves in sodium chloride and yields colourless salts, and other aurous double salts are colourless, and yield colourless solutions. The soluble aurous salts appear to be colourless, and the author, therefore, places gold amongst those elements yielding both coloured and colourless ions.

If the difference between the atomic weights of each two elements as arranged in the author's series be taken, it is found that in the first series the difference is very near to the number 16; then follow 20 elements with a difference which begins at 41.3 and gradually increases to 49. The differences between the remaining elements is 88, with the exception of that between iridium and thallium, whose atomic weights are not yet satisfactorily determined. E. C. R.

Inorganic Chemistry.

The Density of Hydrogen. By EDWARD W. MORLEY (*Zeit. physikal. Chem.*, 1896, **20**, 242—271).—Five series of determinations of the density of hydrogen were made. In the first series, the gas was weighed in large calibrated flasks, and the pressure and temperature taken by a barometric manometer and mercury thermometer. In the second series, the volume was measured at the temperature of melting ice, and the pressure measured by a siphon barometer. The details of these methods are practically the same as those in the case of the oxygen determinations (*Abstr.*, 1895, ii, 261; this vol., ii, 518). The hydrogen was obtained by electrolysis, and the utmost pains taken to ensure its purity; in those cases where analysis showed nitrogen to have been present (maximum, 0·0045 per cent.) the density was corrected for this. The results of the 15 experiments of the first series varied between $D = 0\cdot089993$ and $0\cdot089846$ (grams/litre) with the mean value $0\cdot089938 \pm 0\cdot000007$. The results of 19 determinations of the 2nd series varied between $0\cdot090144$ and $0\cdot089869$ with a mean value $0\cdot089970 \pm 0\cdot000011$. In the third, fourth, and fifth series, a tube containing 600 grams of palladium charged with hydrogen was placed in communication with three exhausted calibrated flasks of a total capacity of 42 litres, kept in melting ice. The weight of the hydrogen was obtained by the loss in weight of the palladium tube, and the pressure of the gas, read by a siphon barometer; by this method, the weighing of the hydrogen is effected with greater accuracy than when it was made in the measuring flasks themselves, and the author considers this method to be far preferable to the former. Full details of the apparatus and the manipulation are given in the paper. The results of these last three series are—

	No.	Mean value.	Difference of extremes.
3rd	8 determinations	$0\cdot089886 \pm 0\cdot0000049$	$0\cdot000040$
4th	6 „	$0\cdot089880 \pm 0\cdot0000080$	$0\cdot000070$
5th	11 „	$0\cdot089866 \pm 0\cdot0000034$	$0\cdot000044$

The final mean of the results is given as $D = 0\cdot089873 \pm 0\cdot0000027$.

L. M. J.

Helium, a Gaseous Constituent of certain Minerals. Part II. Density. By WILLIAM RAMSAY (*Proc. Roy. Soc.*, 1896, **59**, 325—330; see *Abstr.*, 1895, ii, 498). The gas obtained from clèveite contains some, but not much, nitrogen, and no hydrogen. Samples of gas from bröggerite, samarskite, and fergusonite, obtained by heating the mineral in a vacuum, are rich in hydrogen; the amount of nitrogen is in all cases infinitesimal. The yield from these sources is

very variable; for whereas 1 gram of clèveite yielded 7.2 c.c. of helium, 1 gram of bröggerite yielded somewhat less than 1 c.c. of helium; the yield from samarskite was about 0.6 c.c. per gram; and from fergusonite 1.1 c.c. per gram, the last by heating alone; with the other minerals, the residue, after heating, was fused with hydrogen potassium sulphate. The gas obtained from fergusonite, on heating, was found on analysis to have the following percentage composition:—Hydrogen, 54.7; carbonic anhydride, 13.9; helium, 31.2. No hydrocarbons were present, and the residue gave a spectrum free from nitrogen flutings, even when the pressure was comparatively high.

Density determinations were made with gas purified by treatment with caustic soda, and circulation over red-hot copper oxide, soda-lime, and phosphoric anhydride. The bulb used had the capacity 162.843 c.c., and the possible error in the results may amount to 0.014. The following numbers were obtained.

		Means.
Mixture of gas from bröggerite and clèveite ..	2.218	—
Same mixture, recirculated	2.133	—
The last sample is probably the purer.		
Bröggerite gas; fresh sample	2.181	2.181
Samarskite; heat alone	2.121	2.118
Samarskite; fusion with H_2SO_4	2.122	
Samarskite; gas again circulated	2.117	
Samarskite; after further circulation	2.114	
Fergusonite; heat alone	2.147	2.140
Fergusonite; another sample	2.139	
Fergusonite; another sample	2.134	

These numbers furnish some ground for the supposition that the helium from various sources is not quite homogeneous, but that different samples differ slightly in density. They point to a possible division into groups. The gas from bröggerite appears to have the density 2.18, that from samarskite 2.12, and that from fergusonite 2.14. The gas from clèveite is possibly still lighter.

The light emitted from a vacuum tube containing clèveite gas has a richer orange-yellow shade than is shown by gas from bröggerite, samarskite, or fergusonite. The clèveite gas shows, in addition to the usual strong lines, a set of fairly strong lines between the very strong green and the strong blue. These lines have never been observed in samples of gas from bröggerite, samarskite, or fergusonite.

Reversta, p. 1053 Joseph H. C.

New Gas obtained from Uraninite. By ~~John~~ NORMAN LOCKYER (*Proc. Roy. Soc.*, 1896, **59**, 342—343).—Runge and Paschen, as the result of diffusion experiments on the gas from clèveite, came to the conclusion that the gas giving the line D_3 was heavier than the gas giving the line 5015.7, but the result was not final, as the pressures were not the same. It is important for stellar classification to settle this matter, and the author has therefore made experiments in which the pressures remained the same. These clearly indicate that if a true diffusion of one constituent takes place, the component which gives D_3 is lighter than the one which gives the line at wave-

length 5015·7. This conclusion is entirely in harmony with the solar and stellar results.

See enata p. 1053

H. C.

Gases obtained from the Mineral Eliasite. By *Joseph* ~~JOHN~~ NORMAN LOCKYER (*Proc. Roy. Soc.*, 1895, **59**, 1—3).—Observations have been made on the gases obtained from the mineral eliasite when heated in a vacuum; in addition to lines of known gases, others have been noted, for which no origins can be traced. Many of these are probably coincident with lines in stellar and solar spectra, but there are others with which no celestial coincidences have been traced. It is important to note that all these lines do not appear in the spectrum at the same time. In the first two portions of the mineral no trace of D_3 was noted, but in the third portion examined, all coming from the same specimen, D_3 appeared as a pretty bright line. In one experiment, the products of distillation, collected in four stages, gave different spectra. The lines observed in eliasite indicate a new gas, in some way associated with those given off by clèveite and bröggerite, and the fact that D_3 is not necessarily present in the spectrum, furnishes an additional argument in favour of the view that the gas obtained from clèveite or bröggerite is complex.

H. C.

New Gases obtained from Uraninite. By *Joseph* ~~JOHN~~ NORMAN LOCKYER (*Proc. Roy. Soc.*, 1895, **59**, 4—8; compare *Abstr.*, 1895, ii, 430 and 470).—The author in this paper brings together the notes which he has previously made on the spectra of the new mineral gases. Besides the hydrogen lines, all three chromospheric lines in Young's list which have a frequency of 100 have now been recorded in the spectra of the new gas or gases obtained from minerals by the distillation method. Determinations of the wave-lengths of many other lines in the spectra of the new gases have been made, and the results leave little doubt as to the coincidence of several lines with those appearing in the chromosphere, nebulae, and white stars. It seems very probable also that many lines which have been noted, and for which no origins have yet been traced, belong to gases which have not hitherto been recorded in the chromosphere. A table is given which summarises the chief lines which have so far been recorded in the new gases from various minerals.

H. C.

Expansion of Argon and of Helium as compared with that of Air and Hydrogen. By J. P. KUENEN and WYATT W. RANDALL (*Proc. Roy. Soc.*, 1896, **59**, 60—65).—The authors have compared the readings shown by thermometers containing respectively argon, helium, hydrogen, and air, at the temperatures of the melting point of ice and the boiling points of water, chlorobenzene, aniline, quinoline, and bromonaphthalene. The helium used was of density 2·13 ($O = 16$), and the argon, which was prepared from atmospheric air by the magnesium method, had the density 19·99.

The results of the observations are given in the table. In three cases (3, 4, and 6) the reading was taken at 0° , as well as at the boiling point of water, so that the coefficient of expansion could be calculated between these two points. The higher temperatures deter-

mined have been derived from the observed pressures by using the coefficients thus measured; with the hydrogen thermometer, 0.003663 was taken as the coefficient of the gas.

Thermo- meter.	Cor- rected pressure, 0°.	In steam at about 100°	Coeffi- cient of expan- sion, 0—100°.	Temperatures calculated.			
				Chloro- benzene.	Aniline.	Quino- line.	Bromo- naphtha- lene.
1. Hydrogen.	—	712.56	—	131.6	183.9	236.35	—
2. Air I	—	737.74	—	131.8	183.6	[234.9]	281.65
3. Helium. . .	567.02	775.18	0.003665	132.2	184.1	236.9	[278.3]
4. Argon I. .	517.02	706.06	0.003668	132.15	184.1	—	—
5. Argon II. .	529.54	—	—	—	—	237.8	281.5
6. Air II. . . .	511.68	698.79	0.003663	—	—	237.1	—

Although the authors do not claim any remarkable accuracy for these results, they serve to show that the behaviour of argon and helium, as far as expansion is concerned, and within the limits of temperature used, is the same as that of so-called perfect gases or mixtures of them.

H. C.

Some Physical Properties of Argon and Helium. By LORD RAYLEIGH (*Proc. Roy. Soc.*, 1896, 59, 198—208).—The density of argon prepared by the aid of magnesium was found by Ramsay (this vol., ii, 99) to have a mean value of 19.941 ($O = 16$). To further test the identity of the gases, the author has determined the density of argon prepared by Cavendish's oxygen method; large scale weighings of pure argon with the globe of 1800 c.c. capacity employed in former weighings of gases, being undertaken. A series of weighings was obtained with intermediate sparkings, so as to obtain evidence that the purification had really reached a limit. The density thus determined was found to be 19.940, and the conclusion from the spectroscopic evidence that the gases, isolated from the atmosphere by magnesium and by oxygen, are essentially the same, is confirmed.

The refractivity of argon was determined in the hope that it might throw some light on the character of the gas. As absolute measurements were not required, it sufficed to compare the pressures necessary in two columns of air and argon of equal lengths, in order to balance the retardations undergone by light in traversing them. The ratio of the refractivity of argon to that of air was thus found to be 0.961, so that the evidence from the refractivities is very unfavourable to the view that argon is an allotropic form of nitrogen such as would be denoted by N_3 .

Similar comparisons were made between air and helium. The observations were not made under ideal conditions, on account of the smallness of the changes of air pressure; but, with considerable approximation, the refractivity of helium to that of air is 0.146. The

lowest refractivity previously known is that of hydrogen, nearly 0·5 of that of air.

The viscosity of argon and helium was investigated by the method of passage through capillary tubes. If the driving pressure ($p_1 - p_2$) is not too great, the volume V_2 delivered in time t through a tube of radius R and length λ is given by

$$V_2 = \pi t \frac{p_1^2 - p_2^2}{2p_2} \frac{R^4}{8\eta\lambda},$$

the volume being measured at the lower pressure p_2 , and η denoting the viscosity of the gas. The results referred to dry air were, for helium, 0·96, and for argon, 1·21, somewhat higher than for oxygen, which at present stands at the head of the list of the principal gases.

Examination of the gas from the Bath springs showed that this gas contains appreciable quantities of helium in addition to the argon already proved to be present. The gas from the Buxton springs contains about 2 per cent. by volume of argon, but the presence of helium could not be confirmed.

The question of the presence of helium in the atmosphere is, apart from its independent interest, of importance in connection with the density of atmospheric argon. Since the spectrum of this gas does not show the line D_3 , we may probably conclude that the proportion of helium is less than 3 per cent.; so that there would be less than 3×10^{-4} of helium in the atmosphere. Ramsay has shown that the solubility of helium in water is less than one-fifth that of argon, so that if a mixture of helium and argon be dissolved in water until there is only a small fraction remaining over, the proportion of helium will be much increased in the residue. 60 c.c. of argon was therefore treated with boiled water until the volume was reduced to 1·5 c.c. The gas still gave no sign of the D_3 line, and if helium is present in the atmosphere, it must be in very small quantity, probably much less than a ten-thousandth part.

H. C.

Acids containing Sulphur and Nitrogen. By MAX WAGNER (*Zeit. physikal. Chem.*, 1896, **20**, 334).—The author regrets having, in his previous paper on acids containing sulphur and nitrogen (this vol., i, 470), omitted reference to the work of Hantzsch (this vol., ii, 95, 96) and of Divers (*Ber.*, **28**, 996; **27**, 567. See *Trans.*, 1895, 452, 1095, 1098).

L. M. J.

Nitrosodisulphonic acid. By PAUL SABATIER (*Compt. rend.*, 1896, **122**, 1479—1482 and 1537—1539).—The absorption spectrum of the blue-violet solution formed by a nitrite and cuprous oxide in presence of sulphuric acid (this vol., ii, 622) is quite different from the spectra of the ammonio-cupric compounds or the purple cupric hydrobromide, but is similar to that of the deep blue-violet solution of the potassium nitrosodisulphonate described by Fremy and by Raschig.

In many cases when nitric acid or nitrogen oxides are dissolved in sulphuric acid containing sulphurous anhydride, and the solution is exposed to moist air, there are indications of the formation of a dark

blue compound. If a mixture corresponding with $2\text{NO} + \text{O}$ is passed into sulphuric acid saturated with sulphurous anhydride and cooled at 0° , the liquid remains colourless, but, on adding water very slowly, a dark blue product is formed. When a mixture of air and nitric oxide is passed into sulphuric acid of the composition $\text{H}_2\text{SO}_4 + \text{H}_2\text{O}$, saturated with sulphurous anhydride and cooled at 0° , the blue-violet compound is formed at once, with vigorous effervescence. With somewhat stronger acid, the liquid is at first colourless, but the blue-violet substance forms gradually. The reaction takes place in two stages, $2\text{NO} + \text{O} + 2\text{SO}_2 + \text{H}_2\text{O} = 2\text{NO}\cdot\text{SO}_3\text{H}$ and $2\text{NO}\cdot\text{SO}_3\text{H} = \text{NO} + \text{NO}(\text{SO}_3\text{H})_2$. Nitrosodisulphonic acid decomposes spontaneously into sulphuric acid, sulphurous anhydride, and nitric oxide, but is much more stable than the potassium salt described by Fremy, and does not decompose rapidly even at 100° .

When agitated with air or mixed with hydrogen peroxide, persulphuric acid, nitric acid, chlorine, or potassium chlorate, it is rapidly decolorised. Potassium perchlorate and bromine act more slowly. Alkali chlorides are immediately decomposed with evolution of hydrogen chloride and chlorine; potassium iodide at once decolorises the liquid, and iodine is liberated. Sulphurous acid is without action; water at once decomposes the blue compound.

Most metallic oxides and carbonates decompose the solution of nitrosodisulphonic acid, and are converted into sulphates. Ferric oxide, however, gives a wine-red solution, and the same compound is formed by placing metallic iron or a concentrated solution of ferrous chloride or sulphate, or some particles of ferrous oxalate into the acid. Ferric salts do not give this coloration.

Cupric carbonate, oxide, or hydroxide, metallic copper, or any cuprous salt yields an intense blue-violet coloration (*loc. cit.*). With copper or cuprous salts, nitric oxide is liberated. Chromic hydroxide also yields a very deep blue-violet solution, but chromium and chromous salts have no action.

In all these cases, the colour of the solutions of the salts is very much more intense than that of the acid, and the solutions themselves are more stable.

C. H. B.

Action of Silicon on Metals. By EMILE VIGOUROUX (*Compt. rend.*, 1896, **123**, 115—118; compare Moissan, this vol., ii, 173).—As regards their action with silicon, the metals may be divided into two classes.

I. Those which do not combine directly with silicon, even in the electric furnace. Examples: alkali metals, zinc, aluminium, lead, tin, antimony, bismuth, gold, and silver. These all dissolve silicon to some extent, but deposit it again, in a crystalline form, on cooling.

II. Those which combine directly with silicon to form crystalline silicides. Examples: iron, chromium, nickel, cobalt, manganese, copper and platinum.

Platinum silicide, SiPt_2 , is a white, extremely hard, brittle solid, its sp. gr. at 18° is 13.8, it is capable of dissolving silicon, and is attacked, when hot, by chlorine and by aqua regia.

J. J. S.

Diamonds from Steel. By A. ROSSEL (*Compt. rend.*, 1896, 123, 113—115; compare Moissan, *Abstr.*, 1893, ii, 275; 1894, ii, 189).—Small diamonds have been obtained from hard steels produced at high temperatures and cooled under great pressure. The steels were treated according to the methods recommended by Berthelot (*Ann. Chim. Phys.*, [4], 19, 392), and by Moissan (*loc. cit.*).

The crystals have the same form, appearance, and properties as those described by Moissan.

J. J. S.

Action of Zinc on the Photographic Plate. By R. COLSON (*Compt. rend.*, 1896, 123, 49—51).—The author shows that if a piece of zinc foil, which has been kept for some time, be partially rubbed with emery paper and then placed in contact with a gelatino-bromide plate for some 24 hours, the plate on development takes on a deep grey tint where the recently rubbed zinc rested, a lighter grey tint where the bright but not recently rubbed surface rested, and that scarcely any change at all is noticeable where the oxidised surface of the zinc came in contact with the plate. This action is due to minute traces of zinc vapour which are given off at ordinary temperature and pressure from a freshly polished zinc surface; the emanation of vapour, however, diminishes as the surface becomes oxidised.

The image is only formed after development, and the author thinks that in certain cases the light used in photography may be replaced by polished zinc-foil.

The zinc vapour has the power of penetrating all porous substances, such as paper, thin strips of wood, &c. Compact substances are opaque to the vapour.

Magnesium and cadmium have the same action on a gelatino-bromide plate, but not lead, tin, copper, iron, or aluminium.

J. J. S.

Vaporisation of Metals at the Ordinary Temperature. By HENRI PELLAT (*Compt. rend.*, 1896, 123, 104—105; compare Colson, preceding abstract).—Experiments made by the author some four years ago show that steel has an action on a photographic plate even when separated from it by a sheet of cardboard. The steel used was in the form of a magnetised bar, the exposure varied from 15 days to several months, and all precautions were taken to exclude light. The action is attributed to the vaporisation of the steel at ordinary temperatures, and to the passage of the vapour through the cardboard.

J. J. S.

Preparation of Alloys. By HENRI MOISSAN (*Compt. rend.*, 1896, 122, 1302—1303).—Many alloys can be obtained by taking advantage of the ease with which metallic oxides are reduced by aluminium. The general method is to throw a mixture of aluminium filings and the oxide of the particular metal into melted aluminium. Part of the aluminium burns, and there is such an energetic development of heat that the most refractory oxides are reduced, the metal mixing with the excess of aluminium. In this way alloys of aluminium with

nickel, molybdenum, tungsten, uranium, and titanium, have been prepared. An alloy can be obtained containing as much as 75 per cent. of tungsten.

The direct preparation of a copper-chromium alloy is difficult, but an aluminium-chromium alloy is readily obtained in the manner indicated, and this dissolves in all proportions in fused copper forming a copper-aluminium-chromium alloy, from which the aluminium is readily eliminated by stirring in cupric oxide, a copper-chromium alloy being left. A similar method can be applied to the introduction of tungsten and titanium into Siemens-Martin steel. C. H. B.

Fusibility of Metallic Alloys. By HENRI GAUTIER (*Compt. rend.*, 1896, 123, 109—113).—Fused alloys, on solidification, behave in a similar manner to fused mixtures of salts, and hence may be divided into three classes corresponding with the three classes of saline mixtures recognised by Le Chatelier.

(1) The metals do not combine in any fixed proportions, and the two constituents crystallise quite distinctly; for example, alloys of tin with zinc, bismuth, or lead.

(2) A definite compound of the two metals crystallises out, but these crystals are scattered in a crystalline matrix of the metal which is in excess; for example, copper with tin or antimony.

(3) Alloys corresponding with isomorphous mixtures of salts; for example, gold with silver.

The fusibility curve of an alloy at once indicates to which of these three classes the alloy belongs.

The author has studied the fusibility of four alloys, tin-nickel, tin-aluminium, aluminium-silver, and antimony-aluminium, and the results show that all four alloys belong to the second class. The curves indicate the following definite compounds, Ni_3Sn_2 , SnAl , or Sn_3Al_2 , Ag_2Al , and SbAl .

Of antimony-aluminium alloys, all which contain more than 2 per cent. of antimony are less fusible than aluminium, and thus form an exception to the rule that binary alloys fuse more readily than the less fusible constituent. Antimony-aluminium alloys, which approximate in composition to SbAl , have the curious property of being slowly and spontaneously reduced to a powder, and the powder thus formed does not melt below 1100° , although the least fusible of these alloys melts at 1050° . The author gives the melting point of antimony, as determined by the pyrometer, as 632° , and not 430° , as stated in text-books. J. J. S.

Action of Phosphorus on Metallic Chlorides. By A. GRANGER (*Compt. rend.*, 1896, 122, 1484—1485).—Phosphorus vapour at a low red heat converts nickel and cobalt chlorides into the corresponding sesquiphosphides Ni_2P_3 and Co_2P_3 . The former is grey, very friable, has a graphitic lustre, and a crystalline and schistose structure, whilst the latter is black, has a metallic lustre, and is readily powdered. These sesquiphosphides are not magnetic; they are not attacked by hydrochloric or nitric acid, or by aqua regia, and chlorine begins to decompose them only at the melting point of hard

glass. They do not alter on exposure to air at a dull red heat, but lose phosphorus when heated in a blow-pipe flame.

Mercuric, stannic, and cadmium chlorides are not affected by phosphorus vapour under similar conditions, and gold and silver chlorides are reduced to the metallic state. Cupric chloride is reduced to cuprous chloride, and eventually yields copper diphosphide if the temperature is below dull redness; at a higher temperature, the composition of the crystalline product is not constant but varies between CuP_2 and Cu_2P_2 .
C. H. B.

Action of High Temperatures on certain Sulphides. By A. MOURLOT (*Compt. rend.*, 1896, 123, 54—57).—Amorphous lead sulphide, when heated in the electric furnace for eight minutes with a current of 35 volts and 50 ampères, yields crystals of galena; when heated for 40 minutes, a mixture of galena and metallic lead is obtained, and with stronger currents, metallic lead alone.

Antimony sulphide behaves in a similar manner, yielding stibnite and the metal; with a current of 300 ampères and 60 volts, however, it is completely desulphurised in a few minutes.

Amorphous zinc sulphide yields würtzite, cadmium sulphide yields greenockite, and aluminium sulphide forms a crystallised variety when similarly treated.
J. J. S.

Desilverisation of Lead by Electrolysis. By DONATO TOMMASI (*Compt. rend.*, 1896, 122, 1476—1477).—The argentiferous lead is cast into convenient forms, and is made the anode in a solution of lead sodium acetate, or lead potassium acetate, which has a very low resistance, and does not yield any lead peroxide on electrolysis. The cathode is a disc of some metal which is not attacked by the liquid; the general arrangement of the electrolytic cell has previously been described (this vol., ii, 511). When the circuit is complete, the lead is transferred from the anodes to the cathode in a spongy form which is readily removed from time to time, whilst the silver falls into a perforated receiver placed below the anode. The lead is afterwards fused with charcoal and the silver with sodium nitrate and borax.
C. H. B.

Aluminium Alloys. By CHARLES COMBES (*Compt. rend.*, 1896, 122, 1482—1484).—When aluminium alloys are prepared by adding a mixture of a metallic oxide and aluminium powder to fused aluminium as proposed by Moissan (this vol., ii, 601), there is loss of aluminium and the alumina which is formed does not separate readily from the alloy. Better results are obtained by adding the sulphide or chloride of the particular metal to the fused aluminium; in the first case the aluminium sulphide rises to the surface of the metal, in the second the aluminium chloride volatilises. Metallic sulphides can be employed when the heat of formation is lower than that of aluminium sulphide; the chlorides can often be used even when their heat of formation is somewhat higher than that of aluminium chloride. When sulphides are used, part of the sodium that is often present in aluminium is eliminated in the sulphide formed.

Aluminium-nickel alloys containing 20 per cent. of nickel were prepared by means of the sulphide; aluminium-manganese alloys containing 4 per cent. of manganese were prepared by means of anhydrous manganous chloride, and have a crystalline fracture resembling that of spiegeleisen. Aluminium-chromium alloys were obtained by using chromic chloride; one containing 7 per cent. of chromium is very brittle, and has a finely crystalline structure, whilst another containing 13 per cent. of chromium is completely crystalline and can be powdered in a mortar. C. H. B.

Hydrolytic Decomposition of Ferric Nitrate and Sulphate.

By UBALDO ANTONY and G. GIGLI (*Gazzetta*, 1896, 26, i, 293—311).—The authors have examined ferric nitrate and sulphate by methods similar to those which they used with ferric chloride (this vol., ii, 250).

On evaporating concentrated ferric nitrate solution, in which the dissolved matter has the composition $\text{Fe}(\text{NO}_3)_3$, at ordinary temperatures, nitric acid is given off. The dissociation of pure ferric nitrate in aqueous solutions, just as in the case of the chloride, increases with the dilution and also with the time elapsing since the preparation of the solution. The salt in the more dilute solutions becomes completely dissociated after a time into colloidal ferric hydroxide and nitric acid, as is shown by the facts that sodium chloride precipitates ferric hydroxide, and that potassium ferrocyanide gives no blue coloration in such solutions; in less dilute solutions, to which ferrocyanide has been added, the blue colour gradually increases in intensity owing to the continued re-formation of the ferric nitrate. Aqueous solutions of ferric nitrate containing less than 0.1 per cent. are quite colourless, thus differing from other dilute solutions of ferric salts which are always coloured; it is supposed that in such dilute ferric nitrate solutions, basic ferric salts are not formed, but rather salts of pyronitric acid, $\text{H}_4\text{N}_2\text{O}_7$, or orthonitric acid H_5NO_5 . Ferric orthonitrate and pyronitrate being simply products of hydrolysis of ferric nitrate, the reaction between all three salts and water is a reversible one; the orthonitrate by further hydrolysis dissociates into ferric hydroxide and nitric acid. Although differing in a few respects, ferric nitrate and ferric chloride solutions behave on the whole very similarly on dilution; solutions of ferric sulphate, however, behave dissimilarly to these two. Clear neutral ferric sulphate solution remains clear until highly diluted, when it becomes gradually turbid owing to deposition of ferric hydroxide; ferric sulphate thus undergoes hydrolytic dissociation in aqueous solution and the dissociation becomes complete in solutions of about 1 in 60,000, sulphuric acid and non-colloidal ferric hydroxide being formed. During the decomposition, true basic ferric salts are first formed and ultimately converted into insoluble ferric hydroxide. The ferric sulphate is slowly reformed on disturbing the equilibrium by adding potassium ferrocyanide if the solution be not too dilute to allow of the solution of the ferric hydroxide in the sulphuric acid.

The amounts of water necessary to decompose equivalent quantities of ferric chloride, nitrate, and sulphate are approximately in

the ratio of the avidity constants of the three acids; the slight divergence in the case of the sulphate being attributed to the fact that the ferric hydroxide does not remain colloidal in presence of sulphuric acid.

W. J. P.

Compounds of the Lower Oxides and Sulphides of Molybdenum with Ammonia and with Potassium Cyanide. By K. VON DER HEIDE and KARL A. HOFMANN (*Zeit. anorg. Chem.*, 1896, **12**, 277—292).—The compound $4\text{MoO}_3, \text{MoO}_2, 2\text{NH}_3 + 7\text{H}_2\text{O}$ is obtained by heating an aqueous solution of ammonium molybdate with half its weight of hydroxylamine hydrochloride on the water bath until the orange precipitate which is at first formed is dissolved, and a greenish-brown solution is obtained; this solution is then rapidly filtered, protected from access of air, and allowed to cool. The compound separates in dark red crystals belonging to the triclinic system, dissolves gradually in water with a reddish-yellow coloration, and is fairly stable. It gradually reduces Fehling's solution in the cold and quickly when heated. With copper sulphate, it gives a beautiful, blue coloration; with mercurous and mercuric salts, a flesh coloured precipitate; with lead nitrate, a yellowish-white precipitate; and with potassium thiocyanate, an intense red coloration. It is gradually decomposed by dilute acids, and reduces ammoniacal silver solution with separation of metallic silver. The authors were unable to obtain other ammonia derivatives with the lower oxides of molybdenum, analogous to the chromamine bases.

The compound $\text{MoO}_2, 4\text{KCN}, \text{NH}_2\cdot\text{OH} + \text{H}_2\text{O}$ is obtained on heating a solution of molybdic acid (10 grams) in an excess of potassium hydroxide with potassium cyanide (20 grams) and hydroxylamine hydrochloride (5 grams); nitrogen is evolved, and the heating is continued until a reddish-violet solution is obtained. On cooling, the compound crystallises in beautiful, violet, monoclinic forms, the aqueous solution of which is red, and shows a characteristic absorption in the green. Yellow oxidation products are gradually formed on exposure to the air. The compound is decomposed by dilute acids with an intense red coloration, and evolution of hydrogen cyanide. It is easily decomposed by strong reducing agents, sodium amalgam, or excess of hydroxylamine, and gives precipitates with mercury, lead, and iron salts. It is not altered by yellow ammonium sulphide in the cold, and, on heating, yields molybdenum trisulphide.

The compound $\text{MoO}_2, 4\text{KCN} + 10\text{H}_2\text{O}$ is obtained as follows: molybdenum trioxide is treated with potassium iodide and hydrochloric acid, and the liberated iodine eliminated by steam distillation; the greater portion of the hydrochloric acid is then removed by evaporation, and the solution neutralised with potassium hydroxide, and mixed with a concentrated solution of potassium cyanide. As soon as the solution changes to a beautiful blue, a large excess of potassium hydroxide is added, whereby the compound is precipitated. It crystallises in bluish-red tablets belonging to the rhombic system; $a : b : c = 0.7324 : 1 : 0.5723$. It is not decomposed by cold dilute acids, but with concentrated sulphuric acid, it gives a black precipitate insoluble in ammonia, and it is decomposed by concentrated hydro-

chloric and nitric acids without the formation of a precipitate. With silver nitrate, it yields a black precipitate, which, on treatment with nitric acid, is converted into silver cyanide. It gives a green coloration with ammonium sulphide, and, on heating, yields sulphomolybdate. With thiocyanates in acid solution, it yields a red compound, which can be extracted by shaking with ether. On precipitating with alcohol the blue mother liquors obtained in the preparation of this salt, and crystallising the precipitate from a small quantity of water, bright, greenish-blue plates were obtained of the formula



and a further crystallisation of the mother liquors yielded compounds which, on analysis, gave numbers agreeing with the formulæ $\text{MoO}_2\text{CN}, 3\text{KCN} + \text{H}_2\text{O}$; $\text{MoO}_2\text{CN}, 3\text{KCN}$, and $\text{MoO}_2, 3\text{KCN} + 4\text{H}_2\text{O}$.

Hydrated molybdenum bisulphide dissolves in potassium cyanide to an intensely green solution, and, on adding alcohol, a greenish oil is precipitated, which gradually solidifies. According to the length of time which is allowed for the action of the potassium cyanide, three different compounds are obtained.

The *compound* $\text{Mo}_2\text{S}_3, 6\text{KCN} + 5\text{H}_2\text{O}$ is obtained by a mild action of the cyanide for a short time. It crystallises in green needles having a silky lustre, is easily soluble in water, and is not altered by alkalis, but is gradually decomposed by dilute mineral acids. It yields characteristic precipitates with mercury, copper, silver, and ferric salts. When warmed with ammonium sulphide, a thiomolybdate is formed.

The *compound* $\text{Mo}_2\text{SO}(\text{CN})_2, 4\text{KCN} + 4\text{H}_2\text{O}$ is obtained by evaporating the solution of the bisulphide in potassium cyanide in a vacuum at the ordinary temperature. It crystallises in beautiful, reddish-brown needles, easily soluble in water; it is stable towards dilute acids and alkalis, but is decomposed by boiling with hydroxylamine with the formation of a red precipitate.

The *compound* $\text{Mo}_3\text{S}_4(\text{CN})_3, 5\text{KCN} + 7\text{H}_2\text{O}$ is obtained by allowing the preceding salt to remain in contact with the mother liquor over sulphuric acid. It separates in large crystals resembling black augite, and appears green by transmitted light. It gives a green solution in water, is not altered by dilute acids or alkalis in the cold, yields a thiomolybdate when warmed with ammonium sulphide, and gives precipitates with copper, lead, and mercury salts. With silver nitrate, it yields a blackish-brown precipitate, which is converted into silver cyanide when treated with nitric acid. E. C. R.

Researches on Tungsten. By HENRI MOISSAN (*Compt. rend.*, 1896, 123, 13—16; compare *Abstr.*, 1893, ii, 471).—Tungsten, in a state of purity, may readily be obtained by heating a mixture of tungstic acid (800 grams) with sugar carbon (80 grams) in the electric furnace, the heating being continued for 10 minutes with a current of 900 ampères and 50 volts. A residue is left which, although distinctly molten on the surface, is quite porous internally.

If the complete fusion of the metal is avoided, the carbon of the crucible does not take part in the reaction, and the excess of tungstic acid is volatilised. The metal, as thus obtained, contains no carbon

and is very pure. In the porous state it can be welded like iron; it can also be filed easily, and, when free from carbon, will not scratch glass. When heated with carbon, as in the cementation process, the exterior portions contain carbon, and become hard enough to scratch rubies.

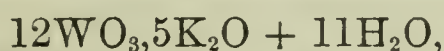
Pure tungsten is less fusible than chromium or molybdenum; it has a sp. gr. = 18.7, and has no action on a magnetised needle.

Fluorine attacks the metal at the ordinary temperature with incandescence, and yields a volatile fluoride; neither nitrogen nor phosphorus has any action on tungsten at a red heat. Silicon and boron, if heated in the electric furnace with tungsten, yield crystalline compounds of metallic lustre, which are capable of scratching rubies. At 1200°, carbonic anhydride is reduced by tungsten, yielding the blue oxide, but no carbon is deposited. The metal is not readily acted on by moist air, but is slowly attacked by water containing carbonic anhydride. Sulphuric, hydrochloric, and hydrofluoric acids act but slowly, whereas a mixture of hydrofluoric and nitric acids dissolves the metal readily. Oxidising agents, such as lead dioxide and potassium chlorate, readily act on the powdered metal.

If, in the preparation of tungsten, the heating is continued for a longer time, the metal melts and combines with the carbon of the crucible. With an excess of carbon, the metal readily forms a definite *carbide*, CW_2 ; this is iron-grey, is harder than corundum, and at 18° has a sp. gr. = 16.06; it has much the same properties as the metal, but is, as a rule, more readily acted on. Boiling nitric acid readily dissolves the carbide, whereas other acids act but slowly.

J. J. S.

Zirconotungstic Compounds. By L. A. HALLOPEAU (*Compt. rend.*, 1896, 122, 1419—1422).—Gelatinous zirconium oxide, prepared by the action of potassium hydroxide on potassium fluorozirconate, dissolves in a boiling solution of potassium paratungstate,



and yields a *zirconodecatungstate*, $10WO_3, ZrO_2, 4K_2O + 15H_2O$; this separates from boiling water in small crystals, which act feebly on polarised light. The mother liquor of this salt, when concentrated in a vacuum, yields a *dizirconodecatungstate*, $10WO_3, 2ZrO_2, 4K_2O + 20H_2O$, in very small, prismatic crystals, which act strongly on polarised light, and show extinction at 30° from the axis of elongation. Both these compounds are almost insoluble in cold water, are converted into insoluble compounds when heated, and yield a mixture of tungstate and zirconate when fused with alkali carbonates. In general properties, they resemble the silicotungstates; the zirconodecatungstate is analogous in composition to the silicodecatungstate, except that it contains a somewhat smaller proportion of water.

Ammonium zirconodecatungstate, $10WO_3, ZrO_2, 3(NH_4)_2O, H_2O + 13H_2O$, is obtained in a similar way, and forms small, rhomboidal prisms, which act strongly on polarised light and show extinction parallel with the axes. The crystals lose water even in contact with the liquid in which they are formed.

The zirconodecatungstates are immediately decomposed by nitric, hydrochloric, or sulphuric acid, with precipitation of tungstic acid, and acetic acid behaves in a similar manner. Phosphoric acid precipitates gelatinous zirconium phosphate. Ammonia precipitates zirconium hydroxide, and the precipitate does not redissolve when the liquid is boiled and the ammonia expelled. In the case of the silico-decatungstates, the precipitate redissolves. Potassium hydroxide produces a similar precipitate, and the salts of many metals precipitate insoluble zirconodecatungstates. C. H. B.

Action of Iodine on Stannous Chloride. By V. THOMAS (*Compt. rend.*, 1896, **122**, 1539—1541).—When iodine is added to stannous chloride in presence of carbon bisulphide, the liquid is at first rapidly decolorised, and, in the end, remains orange-red. If the bisulphide, in which stannous chloride is quite insoluble, is decanted off and distilled, it is found to contain stannic iodide and iodine trichloride; these can be separated by heating at 150—200°, when the latter volatilises and the iodide is left in a well crystallised form. No stannic chloriodide is obtained, and the reaction seems to be represented by the equation $3\text{SnCl}_2 + 7\text{I}_2 = 3\text{SnI}_4 + 2\text{ICl}_3$.

C. H. B.

Vanadium and Vanadium Carbide. By HENRI MOISSAN (*Compt. rend.*, 1896, **122**, 1297—1302).—Vanadic anhydride (182 grams), mixed with sugar carbon (60 grams), in quantities of 300 grams at a time, is heated for 5 minutes in the electric furnace with a current of 900 ampères and 50 volts. In this way, vanadium is obtained containing 10·5 to 16·2 per cent. of carbon, but if the proportion of sugar carbon amounts to one-fifth of the vanadic anhydride, the reduced vanadium contains 9·2 to 9·9 per cent. of carbon (compare Abstr., 1893, ii, 471). The volatility of the vanadic anhydride makes its reduction difficult, and likewise interferes with the subsequent purification of the vanadium. However, by heating vanadic anhydride for two minutes only in an atmosphere of hydrogen in a carbon tube in the electric furnace with a current of 1,000 ampères and 60 volts, the reduced metal contains only 4·4 to 5·3 per cent. of carbon. It is then white, has a brilliant lustrous fracture, and does not alter when exposed to air; sp. gr. = 5·8 at 20°. It burns in oxygen at a red heat, and is attacked by chlorine at dull redness, but does not become incandescent, and combines readily with nitrogen. It is not affected by hydrochloric acid, and only very slowly by boiling concentrated sulphuric acid.

If the mixture of vanadic anhydride and carbon is heated in the carbon tube of the electric furnace for 9 or 10 minutes, *vanadium carbide* is obtained; this has the composition VC, forms distinct crystals, scratches quartz, melts at a temperature somewhat above the melting point of molybdenum, and is volatile; its sp. gr. is 5·36. It becomes incandescent if heated in chlorine above 500°, burns vigorously in oxygen at a dull-red heat, but does not combine with sulphur at the melting point of glass, and does not react with hydrogen chloride, water vapour, or hydrogen sulphide at dull redness.

Nitrogen and ammonia attack it readily at a red heat, with formation of a nitride. Sulphuric and hydrochloric acids have no action on it, but it is attacked by nitric acid in the cold, and is oxidised readily by fused potassium nitrate or chlorate.

Vanadium, notwithstanding its high melting point, readily forms alloys. A mixture of ferric oxide, vanadic anhydride, and sugar carbon, when heated in the electric furnace, yields a greyish-white, crystalline, brittle alloy containing nearly 20 per cent. of vanadium, and about 8 per cent. of carbon. With copper oxide in place of ferric oxide, an alloy containing 96.52 per cent. of copper and 3.38 per cent. of vanadium is obtained; it is very malleable, is easily filed, and is harder than copper. An alloy of aluminium with 2.5 per cent. of vanadium is obtained by throwing a mixture of vanadic anhydride and aluminium filings into fused aluminium; it is very malleable, but too soft to be filed readily. Silver and vanadium do not form an alloy.

C. H. B.

Action of Nitric Peroxide on Antimony Trichloride. By V. THOMAS (*Compt. rend.*, 1896, 123, 51—54; compare *Abstr.*, 1895, ii, 450).—Antimony trichloride absorbs but little nitric peroxide in the cold, but at its melting point it readily absorbs the gas, becoming first pale yellow, then dark, and finally red. If slowly cooled, it still retains a yellow colour, and contains a certain quantity of the peroxide; it loses the gas, however, when placed in a vacuum or when left exposed for some time to dry air. The question as to whether the peroxide is chemically combined with the chloride or only exists in a state of solution, has been settled by the author by determining the vapour tension of the gas evolved at given temperatures. If a definite compound exists, then it must dissociate at the ordinary temperature, and, according to the laws of dissociation, the tension should remain constant for a given temperature. It was impossible to measure the vapour tension directly on account of the action of nitric peroxide on mercury, but it was accomplished indirectly by estimating the amount of peroxide present in a known volume of the mixed gases by absorbing the peroxide with dilute alkali, and titrating the nitrite formed with potassium permanganate. The vapour tension varied from 3 mm. to 491 mm. for the same temperature (22.5°), thus indicating that the peroxide forms no definite compound with antimony trichloride, but simply remains dissolved.

J. J. S.

Solubility of Carbon in Rhodium, Iridium, and Palladium. By HENRI MOISSAN (*Compt. rend.*, 1896, 123, 16—18; compare *Abstr.*, 1893, ii, 320).—Rhodium, when heated in the electric furnace in the presence of carbon, takes up a small quantity of the latter. With a current of 300 ampères and 50 volts, 1.42 per cent. of carbon was dissolved; with a current of 910 ampères and 50 volts acting during 5 minutes, a larger quantity of carbon, 2.72—7.38 per cent., was absorbed. The greater the amount of carbon the metal contains, the less malleable it becomes; this carbon is left behind in the form of graphite when the metal is heated and chlorine is passed over it.

Iridium and palladium react in a similar manner, dissolving carbon at the temperature of the electric furnace, but yielding it up again, before they solidify, in the form of crystals of graphite.

J. J. S.

Mineralogical Chemistry.

Reproduction of Sodium Magnesium Chlorocarbonate, Sodium Magnesium Carbonate, Darapskite, and Hydrargillite. By AUGUST B. DE SCHULTEN (*Compt. rend.*, 1896, 122, 1427—1429).—Sodium magnesium chlorocarbonate is obtained by heating 150 grams of sodium chloride, 20 grams of sodium carbonate (anhydrous), and 15 grams of magnesium chloride with 550 c.c. of water in a closed flask for eight hours at 100° ; it separates in regular octahedra of the composition $\text{Na}_2\text{CO}_3, \text{MgCO}_3, \text{NaCl}$; sp. gr. = 2.377 at 15° . It is decomposed by cold water, and melts and decomposes at a red heat.

The double carbonate is obtained by reducing the proportion of sodium chloride and increasing that of the carbonate. A good method is to mix a solution of 20 grams of crystallised magnesium nitrate in 50 c.c. of water with a solution of 100 grams of anhydrous sodium carbonate in 400 c.c. of water, and heat the mixture in a closed flask at 100° for 4—5 hours; it crystallises in flat rhombohedra of the composition $\text{Na}_2\text{CO}_3, \text{MgCO}_3$, the acute angle of the face p being about 73° ; sp. gr. = 2.729 at 15° .

Artificial darapskite, $\text{NaNO}_3, \text{Na}_2\text{SO}_4, \text{H}_2\text{O}$, is obtained by dissolving 250 grams of crystallised sodium sulphate in 500 grams of water, adding 400 grams of sodium nitrate, and allowing the filtered liquid to cool slowly. The crystals do not alter at the ordinary temperature but lose water slowly at 100° ; sp. gr. = 2.197 at 15° ; they are monoclinic, elongated along h' , showing the faces $p(001)$, $g'(010)$, $m(110)$, $o'(101)$, $o^3(302)$, $a^3(\bar{2}01)$, the angles being $h'p$ $76^{\circ} 50'$, $h'm$ $56^{\circ} 0'$, $h'o'$ $54^{\circ} 0'$, $h'o^3$ $44^{\circ} 50'$, and $h'a^3$ $52^{\circ} 50'$, which are practically identical with those of the natural mineral.

Hydrargillite (gibbsite) is obtained in distinct crystals by precipitating aluminium hydroxide from a very dilute ammoniacal solution, and heating on a water bath for 15 days. Better results are obtained by slowly precipitating the hydroxide from a hot alkaline solution by means of carbonic anhydride. The crystals contain a small quantity of silica; sp. gr. = 2.423. They show the faces $p(001)$, $h'(100)$, and $m(110)$: the angles $h'm$ and mm are very nearly 120° , and in crystals maced along h' , the angle pp is about 9° , and hence $C = 85^{\circ} 30'$. On g' extinction takes place at an angle of about 20° towards the acute angle of the edges p and h' . On h' the extinction is longitudinal, and the elongation is positive in the direction of the longitudinal edges of the prism.

C. H. B.

Witherite from Przibram. By A. HOFMANN (*Ber. k. böhm. Ges.*, 1896, [1895], No. 15, 1—7).—Witherite has recently been found at

one point in the mineral veins of the Przibram district, Bohemia, as greyish- to yellowish-white, pyramidal crystals, which have the usual polysynthetic structure and show curved and uneven faces. Analysis of water-clear material gave

BaO.	CaO.	SrO.	FeO.	CO ₂ .	Insol.	Total.	Sp. gr.
77.54	0.09	trace	0.14	22.16	0.38	100.31	4.25

It is suggested that the witherite has been formed by the action of alkali carbonates, produced by the decomposition of diabase, on barytes, at a temperature higher than 25°; the barytes of the first generation of the district being often corroded and represented by pseudomorphs.

L. J. S.

Chrysocolla in Andesite-tuff. By GYULA PETHÖ (*Földtani Köz-
löny*, 1895, 25, 236—237).—Amorphous chrysocolla occurs as crusts and cementing the lapilli in an andesite-tuff, near Guravoj, county of Arad, Hungary; the colour is various shades of green and blue. In the interior are radiated patches of malachite, indicating that the copper was first deposited in the tuff as malachite, which was afterwards altered to chrysocolla. Analysis by A. Kalecsinszky gave SiO₂, 40.20; CuO, 37.37 per cent.

L. J. S.

Variations in the Composition of Apatites. By ADOLPHE CARNOT (*Compt. rend.*, 1896, 122, 1375—1380).—Several specimens of apatite from such widely separated localities as Spain, the Tyrol, Norway, &c., and of very different external appearance, were found to correspond in composition with the well-known formula of Rose. Two specimens from Canadian localities and one from the United States were found to contain a proportion of halogen considerably lower than the normal amount. These specimens, however, contained calcium carbonate, and the carbonic acid therein was found to be equivalent to a quantity of fluorine just sufficient to bring the proportion of halogen up to the normal amount. It would seem, therefore, that calcium carbonate as well as calcium chloride can replace the calcium fluoride. When heated in sealed tubes at 160° with sodium carbonate solution, apatite containing fluorine only was but slightly affected, but apatite containing chlorine also was appreciably altered.

Two transparent, yellowish varieties of apatite from the Tyrol were found to contain a very low proportion of halogen, and practically no calcium carbonate. The cause of this abnormal composition is uncertain, but it is noteworthy that these specimens had no outward crystalline form, although they showed the cleavage, and the optical properties of true apatites.

C. H. B.

An Alpine Nickel-bearing Serpentine. By EMILY A. ASTON and THOMAS GEORGE BONNEY (*Quart. Journ. Geol. Soc.*, 1896, 52, 452—460).—The rock is from the summit of the Riffelhorn, near Zermatt; microscopical examination shows the presence of a colourless, flaky, serpentinous mineral, an augite, magnetite, and awaruite. As shown by the analytical results (I), half the minerals must be anhydrous,

and the amount of iron is not much more than sufficient for the magnetite and awaruite. The amount of nickel present in the awaruite is less than 1 per cent., and the remainder replaces calcium in the pyroxene. Sp. gr. of the rock, 2·71.

	SiO ₂ .	Al ₂ O ₃ .	As ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	CuO.	NiO.	CaO.
I.	41·81	0·68	0·13	5·55	1·42	0·15	4·92	trace
II.	40·26	3·61	—	2·58	2·69	—	—	—

	MgO.	Na ₂ O.	H ₂ O (combined).	Moisture.	Total.
I.	39·86	—	4·90	0·04	99·46
II.	41·35	0·71	9·51	0·17	100·88

Another fragment gave Analysis II (mean of two); here calcium and nickel are both absent, and the figures are nearer to those of an ordinary serpentine, although the alumina is somewhat high. The fulgurites, or lightning-tubes, in these rocks are described in detail.

L. J. S.

[**Analysis of Orthoclase from an Odenwald Granite.**] By C. CHELIUS (*Jahrb. f. Min.*, 1896, ii, 69—71; from *Notizbl. Ver. f. Erdkunde, Darmstadt*, 1894, [4], 15, 16—39).—Analysis I is of the older granite from Oberwald, near Steinau; the rock contains porphyritic crystals of orthoclase (Analysis II), and in the ground mass there is much plagioclase: hornblende is also present.

	SiO ₂ .	Al ₂ O ₃ .	TiO ₂ .	Fe ₂ O ₃ .	FeO.	CaO.	MgO.
I.	63·86	17·87	0·03	1·24	2·88	3·33	0·99
II.	69·30	14·28	—	0·42	0·28	2·03	0·14

	K ₂ O.	Na ₂ O.	P ₂ O ₅ .	H ₂ O.		SO ₃ .	Total.
				Chem. comb.	Hygroscopic.		
I.	3·56	4·10	0·65	0·84	0·17	—	99·52
II.	9·79	2·11	0·60	0·39	0·07	0·33	99·74

L. J. S.

The Mode of Occurrence of Gold in the Ores [Rhyolite] of the Cripple Creek District. By RICHARD PEARCE (*Proc. Colorado Sci. Soc.*, 1894, 5 [Read January 8, 1894], 8 pp.).—The Cripple Creek ore is a rhyolite, having the joints and cracks lined by psilomelane, with which is associated the gold; pyrites is abundant. In the unaltered rock, gold occurs in combination as telluride (sylvanite), and is associated with fluorite; but in the altered, clayey portions it occurs free, either in a fine state of division or as brittle plates pseudomorphous after sylvanite, the tellurium here being in the oxidised form, as is shown by the fact that it can be readily extracted by hydrochloric acid. The ratio of tellurium to gold in the oxidised ore is higher than that required for sylvanite, indicating that other tellurium minerals (possibly native tellurium) must have been originally present, or that some of the gold has been subsequently removed. It is suggested that the ore has originated by solutions having impregnated the rock with pyrites and sylvanite.

L. J. S.

Further Notes on Cripple Creek Ores. By RICHARD PEARCE (*Proc. Colorado Sci. Soc.*, 1894, 5, [Read April 5, 1894], 7 pp.).—The following analyses, by F. C. Knight, are given of the unoxidised portion (I) and of the oxidised portion (II) of a single specimen of the rhyolite which forms the Cripple Creek ore.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	Fe.	S.	SO ₃ .	MgO.	Te.	TeO.
I.	56.70	19.35	—	4.20	4.75	—	0.37	0.10	—
II.	50.55	19.93	10.57	—	—	2.55	0.12	—	0.78

	Au.	Ag.	MnO ₂ .	H ₂ O.	K ₂ O, Na ₂ O [diff.].
I.	0.041	0.022	—	0.50	[13.967]
II.	0.049	—	0.27	3.05	[12.131]

In the unoxidised portion of the rock, pyrites and sylvanite are present; although the latter is not visible, even with the aid of a lens, its presence is indicated by the relative proportions of gold, silver, and tellurium shown in the analysis. In the oxidised rock, the pyrites is represented by a hydrated basic ferric sulphate near glockenite, the tellurium is present as oxide, and the gold is free, the latter being rarely visible as a soft, brownish deposit. L. J. S.

A suspected New Mineral from Cripple Creek. By F. C. KNIGHT (*Proc. Colorado Sci. Soc.*, 1894, 5, [Read October 1, 1894], 6 pp.).—R. Pearce has previously pointed out the existence of tellurium in an oxidised form in the Cripple Creek ores (see preceding abstracts), and in this paper it is shown to be present as an *iron tellurite*. The specimen examined consists of a crystalline telluride intimately associated with a light brown, brittle, amorphous matrix. Analysis of the whole gave the following results.

Sol. in HCl.					
H ₂ O.	Fe ₂ O ₃ .	TeO ₂ .	SeO ₂ .	Ag.	
0.45	8.12	17.81	0.45	0.22	

Insol. in HCl.					Total.
SiO ₂ .	Au.	Ag.	Te.	Se.	
38.25	18.41	1.20	14.72	0.32	99.95

From the portion insoluble in hydrochloric acid, the telluride was dissolved by nitric acid, and the free gold by aqua regia. The tellurium is present as tellurous, and not as telluric, oxide, as is shown by the fact that no chlorine was evolved, and no gold dissolved, when the material was treated with hydrochloric acid. Eliminating silver (which is present owing to the solubility of silver chloride in tellurium tetrachloride) and calculating to 100, the portion soluble in hydrochloric acid gave the results under I; with another specimen, the results under II were obtained.

	Fe ₂ O ₃ .	TeO ₂ + SeO ₂ .	H ₂ O.	Total.
I.	30.27	68.05	1.68	100.00
II.	35.44	62.79	1.77	100.00

The first of these corresponds with the formula $2(\text{Fe}_2\text{O}_3, 2\text{TeO}_2) + \text{H}_2\text{O}$.

The crystalline telluride when separated from the matrix gave, on analysis, the following results, showing its identity with calaverite (compare this vol., ii, 31).

Au.	Te.	Ag.	Total.
40.14	56.22	3.63	100.00

L. J. S.

Analyses of Spherulites and Matrix of Rocks. By HUGH H. F. HYNDMAN and THOMAS GEORGE BONNEY (*Geol. Mag.*, 1896, **3**, 365—371).—Analyses are given of the sea-green matrix (I) and of the reddish spherulites (II) of a pyromeride (rhyolite) from Boulay Bay, Jersey. Under the microscope, the matrix shows a mosaic of quartz and felspar, with plumes and granules of a chloritic mineral and ferrite; the spherulites are not unfrequently traversed by veins of chalcedonic quartz.

	SiO_2 .	Bi_2O_3 , &c.	Al_2O_3 .	Fe_2O_3 .	FeO.	CuO , &c.	NiO.	CaO.
I.	78.40	0.58	8.81	—	4.02	trace	0.29	0.57
II.	73.23	0.51	11.45	4.50	—	0.30	trace	0.38

	MgO.	K_2O .	Na_2O .	H_2O .	Total.
I.	0.20	2.62	3.06	1.53	100.08
II.	0.02	2.77	5.14	0.81	99.11

The matrix therefore contains more quartz and more orthoclase, relatively to albite, than the spherulites; analyses of the matrix and spherulites of an artificial glass, however, show these relations reversed.

L. J. S.

The Costilla Meteorite. By RICHARD C. HILLS (*Proc. Colorado Sci. Soc.*, 1895, **5**, [Read January 7, 1895], 2 pp.).—This meteorite, which weighs about 78 lbs., was found in August, 1881, on the north slope of Costilla Peak, about six miles south of the boundary line between Colorado and New Mexico. The etched surface shows bands of kamacite and tænite parallel to the octahedral cleavage. A little troilite, schreibersite, and a substance like graphite are present. An analysis by L. G. Eakins gave

Fe.	Ni.	Co.	P.	S.	Total.
91.65	7.71	0.44	0.10	0.26	100.16

L. J. S.

Meteorite of Lesves. By ALPHONSE F. RENARD (*Bull. Acad. Belg.*, 1896, [3], **31**, 654—663).—A meteorite weighing nearly 2 kilos. fell at Lesves in Belgium on April 13th, 1896, burying itself 40 cm. in the ground. Analysis by Stöber gave

SiO_2 .	Al_2O_3 .	Cr_2O_3 .	FeO.	CaO.	MgO.	K_2O .
39.46	3.33	1.02	15.82	1.54	22.75	0.09
Na_2O .	Fe.	Ni.	Co.	S.	Total.	Sp. gr.
1.05	12.36	1.37	0.11	2.25	101.15	3.575

The mineralogical composition is given as

Olivine ($\text{Fe}_2\text{SiO}_4 + 2\frac{1}{2}\text{Mg}_2\text{SiO}_4$).	Bronzite ($\text{FeSiO}_3 + 3\text{MgSiO}_3$).	Nickel- and cobalt-iron.	Troilite. (FeS).	Chromite.
45.88	22.33	9.91	6.18	1.51

Maskelynite and a monosymmetric pyroxene are also probably present.

The structure is chondritic, and both the crystals and the chondrules of olivine and bronzite contain glassy and other enclosures. Under the microscope, the olivine shows undulose extinction and a fragmentary structure similar to mortar-structure; it is, therefore, considered that the paste of the meteorite is a product of cataclastic action. In the crust three zones can be distinguished. L. J. S.

Acid Spring near Rome (Ponte Molle). By G. FELICIANI (*Gazzetta*, 1896, **26**, i, 281—289).—The author has examined the water from an acid spring situated several kilometres from the Porta del Popolo, Rome, and at the right of the Via Flaminia; the water is reputed to have a therapeutic value, and was analysed by Morichini in 1820, and by Commaille and Lambert in 1859. The middle one of the three sources enjoys the greatest reputation, and was, therefore, most fully examined.

In January, 1895, the water issued at 14.6° , the atmospheric temperature being 10° , and had the sp. gr. at $14.6^\circ/0^\circ$ of 1.00216. One litre at 0° and 760 mm. contained 356.30 c.c. of free carbonic anhydride, 2.10 c.c. of oxygen, 23.40 c.c. of nitrogen, and the following quantities of various salts in grams.

NaCl.	KCl.	LiCl.	MgCl ₂ .	KNO ₃ .	Na ₂ B ₄ O ₇ .
0.2669	0.1989	0.0115	0.1546	0.0476	0.0190
	NaHCO ₃ .	CaH ₂ C ₂ O ₆ .	CaSO ₄ .	SiO ₂ .	
	0.6454	0.8411	0.1463	0.0310	

The water also contains traces of iron, magnesium, aluminium, and iodine.

This spring thus affords the best natural lithia water to be found in Italy. W. J. P.

Water from the Chalybeate Spring of Óvári. By SIGISMUND NEUMANN (*Földtani Közlöny*, 1895, **25**, 268; from *Math és term. tud. Értesítő*, 1892, **10**, 137—138).—Water from a chalybeate spring near Óvári (near Szathmár, Hungary), contained in parts per 1000: CaSO₄, 0.10431; Ca(HCO₃)₂, 0.45935; Fe(HCO₃)₂, 0.14098; Mn(HCO₃)₂, 0.00239; Mg(HCO₃)₂, 0.22059; NaHCO₃, 0.18014; NaCl, 0.04973; KCl, 0.01343; lithium, trace; SiO₂, 0.03170; humic acids, 0.01660; total solids, 1.21922; free CO₂, 0.14216.

L. J. S.

Water of the Kaw River and its Tributaries. By EDGAR H. S. BAILEY and EDWARD C. FRANKLIN (*Kansas Univ. Quart.*, 1894, **3**, 91—102).—Analyses are given of the water taken from the Kaw or Kansas River at different points, and also of the waters of its tributaries.

The waters of the tributaries show considerable differences amongst themselves; for example, the Saline River contains 232·30 parts of total solids in 100,000, whilst the Delaware River contains only 39·56 parts; the Kaw River contains 77 parts of total solids in 100,000. The organic matter in these waters is relatively high, and has been derived from the rich prairie soils. L. J. S.

Physiological Chemistry.

Importance of Digested Crude Fibre as Food. By P. HOLDEFLEISS (*Bied. Centr.*, 1896, **25**, 372—379; from *Ber. phys. Lab. landw. Inst. Univ. Halle*, Heft 12, 52).—The results of direct experiments showed that crude fibre is digested in the rumen, and especially in the cæcum, but not in the abomasum. The crude fibre is partly dissolved by fermentation, and is partly converted into more readily soluble intermediate products, resembling amyloid.

In order to ascertain the food value of digested crude fibre, experiments were made in which a sheep was fed, first with hay alone, next with half the amount of hay together with earth-nut cake, potato starch, sugar, and salt; in the third period, crude fibre was substituted for starch, whilst in the fourth period, the sheep had the same food as before, except starch and crude fibre. A control experiment was made with a second sheep. From the amounts of food constituents actually consumed, and from the amounts and composition of the excrement, it is concluded that, as compared with that of nitrogen-free extract, the food value of crude fibre is, on the average, as 80:100. N. H. J. M.

Fermentative Processes in the Organs. By CESARE BIONDI (*Virchow's Archiv*, 1896, **144**, 373—400).—E. Salkowski has described a phenomenon which occurs in the organs after death, and which is not putrefaction. He believes it to be due to the action of an enzyme, and terms it “autodigestion.” The most marked action is the formation of amido-acids and substances of the xanthine group. Neumeister considers that the action is simply due to trypsin.

The present research was carried out with calves' livers, and putrefaction was prevented by chloroform water, or sodium fluoride; the former reagent appears to be the most efficacious for the purpose. Salkowski's observations are confirmed. The enzyme, however, is not trypsin, for the following principal reasons: (1) in autodigestion, xanthine-like substances are formed; in tryptic digestion, these are present in a “latent” condition. (2) Autodigestion is not inhibited by an acid medium. (3) Tryptophan, the substance which reacts with bromine water, is a product of tryptic, but not of auto-digestion.

W. D. H.

Theory of Lymph-Formation. By WILHELM COHNSTEIN (*Pflüger's Archiv*, 1896, **63**, 587—612).—This paper is largely

polemical, criticisms being directed chiefly against Mendel (this vol., ii, 315). The author still holds that diffusion and filtration will explain lymph-formation: and although he admits that physical and chemical changes in the protoplasm of the endothelial cells will influence the formation of lymph, he still regards the secretion theory as unproved and unnecessary.

W. D. H.

Formation of Sugar by the Liver. By MAX MOSSE (*Pflüger's Archiv*, 1896, **63**, 613—621).—Seegen found, in opposition to Pavy, that the blood of the hepatic vein is much richer in sugar than that of the portal. Cavazzani (*Pflüger's Archiv*, **57**, 181; *Centralbl. f. Physiol.*, **8**, No. 2) has shown that this might be due to stimulation of the sympathetic nerves, causing an increased decomposition of the hepatic glycogen. Other factors which tend to vitiate results are the influence of anæsthetics, the production of muscular struggling if no anæsthetics are given, and faulty methods of estimating sugar.

Accordingly in the present research the blood from the hepatic vein was collected by catheterisation through the jugular vein; the abdominal cavity was not opened at all, and arterial blood collected from the crural artery was used as the blood with which to compare the hepatic blood; the animals (dogs and sheep) had fasted for 24 hours before the operation; during the operation they were lightly morphinised.

In each experiment two portions of each kind of blood were collected: an interval of 10 minutes occurred between the collection of the samples; the second sample always showed an increased percentage of sugar. Coagulation of the blood was prevented by ammonium oxalate, proteid was removed by the addition of metaphosphoric acid, and the sugar was estimated by Allihn's method. The mean of seven experiments gives:

Arterial blood contains 0.093 gram of sugar per 100 c.c.

Hepatic venous blood contains 0.107, or a plus of 0.014 per cent.; this figure is much smaller than Seegen's, but is, nevertheless, in favour of the glycogenic function of the liver, as taught by Bernard. The question as to whether sugar is the principal, or only, source of energy in the organism is not discussed.

W. D. H.

Paralytic Intestinal Juice. By LAFAYETTE B. MENDEL (*Pflüger's Archiv*, 1896, **63**, 425—439).—The so-called paralytic intestinal juice is the secretion that occurs in the intestine after section of its nerves. The present experiments show that it is, nevertheless, a true secretion, and not, as some assume, a transudation from the blood. Its composition, especially as regards its alkalinity and percentage of chlorine, is similar to that of the normal juice as obtained by a fistula. Its small percentage of proteid is against the transudation theory. Its action on food-stuffs is like that of the normal juice; histological examination of the mucous membrane shows no deviation from the normal.

W. D. H.

Alterations in the Blood in Anæmia. By SOPHIE VON MORACZEWSKA (*Virchow's Archiv*, 1896, **144**, 127—158).—In pernicious anæmia, there is a great diminution of the alkalinity of the blood; this fluid has a high specific gravity, a small number of corpuscles—the red corpuscles are rich in pigment—and the blood has its total nitrogen increased. In chlorosis, the blood has a low alkalinity and a high specific gravity; the majority of red corpuscles are deficient in hæmoglobin.

In carcinoma, the blood has a high alkalinity, and a low specific gravity; the total dry residue is small, and the majority of red corpuscles are but feebly pigmented. W. D. H.

Excretion of Ammonia in Disease. By THEODOR RUMPF (*Virchow's Archiv*, 1896, **144**, 563—568).—Polemical. The author maintains the correctness of his views against those of Hallervorden (compare this vol., ii, 379). W. D. H.

Action of the Kidney in the Light of the Theory of Osmotic Pressure. By GUSTAV TAMMANN (*Zeit. physikal. Chem.*, 1896, **20**, 180—197).—The osmotic pressures of the various substances which are dissolved in the blood were estimated, and the author then considers the probable filtration action in the glomeruli. The view that in the glomerulus water alone is filtered off must be abandoned, since this would necessitate a blood pressure of over 7·7 atmos., whilst the actual difference of pressure between the blood in the looped veins and the liquid in the glomerulus capsule is probably only about 20 mm. The author considers it, therefore, most probable that all the soluble salts, &c., of the blood are filtered off, with the exception of albumin. The glomerulus filtrate is not, however, urine, and for its conversion requires a concentration of many salts, and especially of urea. This cannot be due to absorption of water by the blood, but how, and in what portions of the tubules, the changes take place, the author has not determined.

L. M. J.

Chemistry of Vegetable Physiology and Agriculture.

Cell-wall of Cotyledons of *Lupinus luteus* and *Lupinus angustifolius*. By ERNST SCHULZE (*Zeits. Physiol. Chem.*, 1896, **21**, 392—411).—The conclusions of Elfert (*Bibliotheca botanica*, 1894), Nadelmann (*Ber. d. Bot. Gesel.*, 1889, 248), and Tschirch (*Pflanzen-anatomie*, **1**, 453) are not in accordance with the observations of E. Steiger and the author (Abstr., 1887, 440; 1889, 643, &c.), who have shown that the cell-wall of the cotyledons of *Lupinus luteus* and *L. angustifolius* contains a considerable proportion of a substance whose properties are quite distinct from those of ordinary cellulose, and to which they allude as paragalactan. Unlike cellulose, it dissolves readily in 1 per cent. hydrochloric or sulphuric acid, and, on

hydrolysis, yields galactose and a pentose (probably arabinose), and no glucose; further, when oxidised by nitric acid, it gives mucic acid. These facts afford a basis for its approximate quantitative determination.

A definite number of shelled seeds of *L. luteus* or *L. angustifolius* were weighed, powdered, and extracted with water, dilute soda, alcohol, and ether, and the residual, insoluble, non-nitrogenous "paragalactan residue" dried and weighed; the latter was then hydrolysed by dilute sulphuric acid, and the glucose contained in aliquot portions of the solution was determined, a second portion being freed from sulphuric acid by means of barium carbonate, filtered, and evaporated, oxidised with nitric acid, and the mucic acid thus formed, collected and weighed. The cotyledons of embryos, of two or three weeks' growth, were then treated in a similar manner, and the results compared.

In the case of *L. angustifolius*, it was found that whilst the cotyledons of two-week-old seedlings yielded one-tenth of the quantity of glucose and one-twelfth of the amount of mucic acid afforded by the corresponding number of seeds, the cotyledons of three-week-old plants showed no further reduction in the amount of mucic acid obtainable, although the yield of glucose had considerably diminished. Estimations of the total insoluble non-nitrogenous matter showed that three-week-old cotyledons contained only about one-fourth of the amount present in the corresponding number of seeds. Similar results were obtained in the case of *L. luteus*.

From the above data it is clear that the portion of the "paragalactan residue" which gives mucic acid, diminished much more rapidly than that affording glucose, and that the diminution in the former is at an end in two weeks' time. This behaviour is in accordance with the belief, already expressed by the author, that the paragalactan is not a simple substance, but is made up of a galactan and an araban, the former being more rapidly utilised than the latter. The results afford conclusive evidence against the views of Elfert, Nadelmann, and Tschirch.

The author has compared the amounts of ordinary cellulose in the seed of *L. angustifolius*, and in the cotyledons after $2\frac{1}{2}$ weeks' growth, and has found them approximately equal. It is obvious, therefore, that the true cellulose is not absorbed in the initial stages of germination.

A. L.

Decomposition and Assimilation of the Nitrogen Compounds of Stable Manure. By STEF. JENTYS (*Bied. Centr.*, 1896, 25, 419; from *Bull. Acad. Sciences Cracovie*, 1893, 345; compare Abstr., 1894, ii, 110).—In fæces, there may be a rather considerable loss of nitrogen when decomposing under conditions of abundant aeration, without evolution of free nitrogen. Elimination of free nitrogen is independent of nitrification, and does not take place when solid excrement decomposes in absence of air. Loss of ammonia from decomposing fæces is very slight in presence of oxygen, and increased temperature and the presence of lime are then without effect; in absence of oxygen, there is abundant production of ammonia. In presence of urine, there is no increased production of

ammonia from fæces; and the urine-ammonia is partly fixed by the products of the decomposing fæces, a portion of the ammonia so fixed being converted by microbes into stable compounds. Fresh horse dung supplies very little nitrogen to plants when buried in well aerated soil; but it remains to be seen how much the availability of the nitrogen of fæces can be increased by excluding oxygen. The assimilability of the nitrogen of dung which is kept in heaps is considerably diminished, as the available urine-nitrogen becomes converted into forms which are decomposed with difficulty, whilst the nitrogen of the fæces does not become more soluble. N. H. J. M.

Methods of determining the Availability of Organic Nitrogen in Fertilizers. By SAMUEL W. JOHNSON and EDWARD H. JENKINS (*Ann. Rep. Conn. Agric. Exper. Stat.*, 1894, No. 18, 73—112; compare *ibid.*, 1885, 115; 1886, 80; 1893, 218).—A number of pot experiments were made in which maize was grown in artificial soil (anthracite ashes and peat), supplied with the necessary minerals and with different amounts of nitrogen in the form of sodium nitrate, dried blood, fish, tankage, ground horn, cotton seed and linseed meals, castor pomace, and raw, roasted, and steamed leather. Soil extract was added to several pots with the view of supplying nitrifying organisms. The amount of produce and of nitrogen contained in it were determined. With regard to the effect of inoculation, the results indicate that, whether nitrification is essential or not to the utilisation of organic nitrogen, artificial inoculation was unnecessary under the conditions of the experiments. Comparing the availability of the nitrogen of the different manures used, and taking sodium nitrate as 100, the following numbers show the relative availability of nitrogen in the substances named: castor pomace (B) = 85; linseed meal = 80; blood = 77; cotton seed meal = 76; castor pomace (A) = 74; horn and hoof = 72; dry fish = 70; and tankage = 68 per cent. Finely powdered, raw leather was absolutely inert, and steamed and roasted leather was almost worthless. The nitrogen of leather which had been heated with sulphuric acid seemed to be as available as that of dried fish.

The solubility of the nitrogen of the same substances in pepsin solution was next determined. When the results are multiplied by 0.826 (which makes the figure obtained with dried blood the same as the figure obtained for the same substance in the vegetation experiments), the two sets of results agree fairly in most cases, so that the solubility of the nitrogen of these substances in pepsin solution is a fairly good indication of the relative availability of the nitrogen for the maize plant under the conditions of the experiments. With horn and hoof, steamed leather, and dissolved leather, the two sets of results were, however, totally different.

Finally, the amount of nitrogen rendered soluble during putrefaction (two and four weeks) was determined, but the results showed no satisfactory agreement, either with those obtained by the pot experiments or by solubility in pepsin solution. N. H. J. M.

Action of Vegetable Acids on Insoluble Phosphates in presence of Nitrates. By GUSTAV LOGES (*Bied. Centr.*, 1896, 25, 366—

367; from *Verhandl. Ges. Deut. Naturforsch.*, 1896, 84).—When basic slag (2 grams) is treated with 2 per cent. hydrogen potassium oxalate solution (250 c.c.) for 48 hours, 27—47 per cent. of the total phosphoric acid is dissolved. Crude phosphates similarly treated give up 40—98 per cent. of the total phosphates. In presence of potassium nitrate (0.08—0.16 per cent.), the solubility of the phosphoric acid of basic slag is much increased (as much as from 28 to 68 per cent.), whilst with crude phosphates this is not the case. In basic slag, the particles of phosphate are encased in a strongly basic, calcareous substance, which is rendered insoluble by oxalic acid, and so protects the phosphate from the action of the acid. When a nitrate is present, nitric acid is liberated by the oxalic acid, and the calcium oxalate dissolved as nitrate. The same amount of nitric acid is alternately liberated and combined with lime, and the oxalic acid is thus enabled to reach the phosphate. Since in crude phosphates the calcareous covering does not exist, the presence of nitrate is without effect. Nitrate has also no effect when citric and tartaric acids are used as solvents for phosphoric acid. N. H. J. M.

Analytical Chemistry.

A Compensation Method in Gasometry. By CARL VON THAN (*Zeit. physikal. Chem.*, 1896, 20, 307—320).—The author describes a form of eudiometer in which the corrections for temperature and pressure are eliminated. The principle of the method is the use of a similar tube containing a definite quantity of nitrogen which can be brought to either of four volumes, equal respectively to 1.25, 1.428, 2.0, and 5.0 times the normal volume. Arrangements are described for bringing the two tubes to the desired positions, so that the level of the mercury is the same in both, and corresponds with one of the observation marks in the compensation tube. Experiments are recorded indicating the accuracy of the instrument.

L. M. J.

Volumetric Estimation of Hydrofluoric acid. By KARL F. STAHL (*J. Amer. Chem. Soc.*, 1896, 18, 415—425).—The strength of the commercial acid, if fairly pure, may be conveniently taken by means of a hydrometer made of platinum, but the following method is preferable.

Total acidity. Two grams of the sample is added to a measured volume of normal soda, allowing the liquid to remain faintly acid; after adding phenolphthaleïn and warming to 50°, the titration is completed.

Hydrofluosilicic acid. Two grams is diluted in a platinum dish with 5 c.c. of water, and partially neutralised with potassium carbonate, employing 0.05 gram for each c.c. of normal soda used in taking the total acidity; alcohol is now slowly added until the mixture

contains 50 per cent. of it, and the whole is left for some time before the precipitate of potassium silicofluoride is collected; after washing it with 50 per cent. alcohol, the precipitate is put into a platinum dish, mixed with 25 c.c. of water, and titrated with normal soda. 1 mol. of potassium silicofluoride requires for neutralisation 4 mols. of sodium hydroxide; every 6 mols. of the latter correspond with 1 mol. of hydrofluosilicic acid.

Sulphuric acid. Four grams of the sample is evaporated in a platinum dish on the water bath until no more acid fumes are given off. The residue is then diluted with water and titrated with normal soda.

L. DE K.

Estimation of Sulphur in Pyrites. By THOMAS S. GLADDING (*J. Amer. Chem. Soc.*, 1896, **18**, 446—449).—A controversy with Lunge (*Abstr.*, 1895, ii, 411). The author again points out that if barium chloride is added all at once to a solution of a sulphate, the precipitated barium sulphate is strongly contaminated with the chloride. If, however, the barium solution is added drop by drop to the boiling solution and excess be avoided, the barium sulphate will be practically pure.

L. DE K.

Detection of Nitrites by means of Cuprous Salts. By PAUL SABATIER (*Compt. rend.*, 1896, **122**, 1417—1419).—When a small quantity of a nitrite is dissolved in concentrated sulphuric acid, and a few particles of cuprous oxide are added, a very intense violet-purple coloration is produced. All cuprous salts produce the same result, although in the case of the dry chloride the coloured product forms slowly. With cuprous iodide, the iodine is liberated, but can be removed by means of chloroform, in which the purple compound is insoluble. Finely divided reduced copper dissolves in the sulphuric acid solution of the nitrite, giving the violet coloration; cupric salts show no similar reaction, nor do salts of many other metals.

The violet-purple solution loses its colour slowly, even in sealed tubes out of contact with air; the change is accelerated by heat, and takes place immediately if the liquid is agitated with air or if oxidising agents are added. Water, or sulphuric acid mixed with one-fifth its volume of water, also destroys the violet compound.

In order to apply this reaction to the detection of nitrites, a very small drop of the liquid is mixed on a porcelain plate with a drop of concentrated sulphuric acid, and a few particles of cuprous oxide are added. It is not so sensitive as the metaphenylenediamine reaction.

C. H. B.

A Modified Ammonium Molybdate Solution. By A. L. WINTON (*J. Amer. Chem. Soc.*, 1896, **18**, 444—445).—One thousand grams of molybdic acid is dissolved in 4160 c.c. of a mixture of 1 part of ammonia (sp. gr. 0.90) and 2 parts of water. 5300 grams of ammonium nitrate is dissolved in a mixture of 6250 c.c. of nitric acid (sp. gr. 1.4) and 3090 c.c. of water, and the molybdate solution is added to it slowly with constant stirring. After a few days, the clear liquid is poured off for use.

This solution differs from Fresenius's solution in that it contains in 50 c.c. an extra 15 grams of ammonium nitrate. The author

claims that the new solution causes a more rapid and complete formation of the yellow phosphoric acid precipitate. L. DE K.

A Simple Method for determining the Neutrality of the Ammonium Citrate Solution used in the Analysis of Fertilisers.

By NATHANIEL W. LORD (*J. Amer. Chem. Soc.*, 1896, **18**, 456—457).

—Pure litmus solution is added to 200 c.c. of distilled water until this is faintly coloured. Half of this is then diluted with its own volume of water; three clear 50 c.c. Nessler tubes are taken, and two are filled with the diluted liquid, and the third to the same depth with the stronger solution. To one of the two first, a drop of dilute sulphuric acid is added, and to the other, a drop of ammonia. These tubes are set one in front of the other, so that the light passes through both, thus giving a strictly neutral purple colour. To the liquid in the third tube is now added 5 c.c. of the citrate solution to be tested, and the colour is then compared with the colour shown by the doubled tubes. The slightest acidity or alkalinity is then at once noticed, and the amount of either acid or alkali necessary to make it neutral may be rapidly ascertained. L. DE K.

Separation of the Insoluble Phosphoric acid derived from Bone Phosphate from that derived from Mineral Phosphate.

By A. P. BRYANT (*J. Amer. Chem. Soc.*, 1896, **18**, 491—498).—As the value of the phosphate insoluble in ammonium citrate is not the same in these two classes of phosphates, a method for separating and estimating them is desirable. The following separating solution is required:—75 grams of potassium iodide and 100 grams of mercuric iodide is dissolved in 350 c.c. of water and evaporated to a sp. gr. of 2.26. The liquid should be kept in a wash bottle.

The special apparatus required consists (1) of a separating tube, made of two tubes about 13 mm. internal diameter, one being 70 mm. in length, closed at one end, the other 200 mm. long, and open at both ends, and connected by a short piece of stout rubber tubing, sufficiently long to allow of the lower closed tube or "bucket" being separated by a screw pinch-cock from the upper portion. (2) An extraction tube, 25 mm. internal diameter, slightly contracted at one end, which has a rim, over which filter paper and cheese cloth can be tied.

In carrying out the separation, 2 grams of the sample is transferred to the extraction tube, and washed with 100—225 c.c. of hot water. After thoroughly drying, it is most carefully removed and transferred to the separating tube; 15—20 c.c. of the separating solution is then poured into the tube, thoroughly shaken, and the sides washed down with a jet of the solution. After five minutes, the lower part of the tube is tapped smartly with the finger to release any light portion carried down with the heavy, and the matter on the top is stirred up with a jet of solution. After the solution has cleared, the rubber tube is clamped, and a beaker is placed under the "bucket," which is then carefully removed, the fingers being protected by india-rubber finger tips. The solution in it containing the mineral phosphate is filtered into the supply flask, the first washings being again evapo-

rated to a sp. gr. of 2.26, and the insoluble phosphoric acid is treated in the usual way. The light portion from the upper tube is treated in a similar manner. If desired, the heavy and light portions can be treated as for total phosphoric acid, thus determining all the phosphoric acid derived from inorganic and organic sources, except that soluble in water.

L. DE K.

Rapid Estimation of Carbonic Anhydride in the Atmosphere, &c. By HENRIET (*Compt. rend.*, 1896, 123, 125—127).—The method described makes use of the fact that a solution of normal potassium carbonate, coloured by a drop of phenolphthaleïn, becomes colourless on the addition of sulphuric acid, the instant the first trace of carbonic acid is set free after the neutral carbonate has become converted into the bicarbonate. The carbonic anhydride in a given volume of air is absorbed by potash and the liquid titrated, an equal volume of the original potash solution is also titrated, and the difference between the titrations multiplied by two gives the amount of carbonic anhydride absorbed. It is obvious that the amount of carbonate in the original potash need not be taken into account.

The apparatus suggested consists of a flask of about 6 litres capacity, fitted with a caoutchouc cork, through which pass a dropping funnel, and a tube bent at right angles and provided with a cock. A given volume of potash, coloured with phenolphthaleïn, and covered with a layer of ether to prevent the absorption of carbonic anhydride from the air, is run into the flask, containing the sample of air, by means of the dropping funnel; the latter is then thoroughly washed out with distilled water, previously boiled to remove carbonic anhydride, and the flask is agitated at intervals during one hour. The potash solution in the flask is then titrated.

J. J. S.

Estimation of Potassium. By CHARLES FABRE (*Compt. rend.*, 1896, 122, 1331—1333).—Potassium platinochloride, precipitated and washed in the usual way, is dissolved in hot water, and reduced to the metallic state by adding magnesium powder previously washed with alcohol and water. The chlorine in the liquid is estimated by means of silver nitrate solution, using potassium chromate as the indicator. A small quantity of insoluble magnesium oxychloride often forms during the reduction, and it is therefore advisable to add a few drops of sulphuric acid; after the reduction is complete, filter, neutralise with calcium carbonate, and then titrate.

C. H. B.

The End Point in Gay-Lussac's Method of Silver Titration. By C. HOITSEMA (*Zeit. physikal. Chem.*, 1896, 20, 272—282).—In the titration of silver by Gay-Lussac's method, the end point of the reaction is, according to Mulder, the "neutral point" at which both silver nitrate and sodium chloride produce a precipitate in the clear, supernatant liquid. The existence of this neutral point is explained by the author by the solubility of silver chloride. As the compound is also present in the solid state, the product of the concentrations of its ions must remain constant, and hence the addition of either silver or chlorine ions must cause a precipitation of the salt. From Stas's

experiments on the sensitiveness of the reaction, the author calculates that in 100 c.c. 23×10^{-5} millimol is the least quantity capable of giving an observable precipitate, *i.e.*, about 1 part in 3,000,000, and from other experiments similar values are obtained. A similar neutral point is not observed in titrating with a bromide or iodide, because the solubility is less than the amount necessary to produce the apparent precipitate.

L. M. J.

Solubility of Barium Sulphate. By FRIEDRICH W. KÜSTER (*Zeit. anorg. Chem.*, 1896, **12**, 261—271).—The author criticises the work of Fresenius and Hintz on the solubility of barium sulphate in water. These chemists found the solubility to be 1 in 100,000 parts of water. If, however, a solution of barium sulphate of this strength is prepared in the manner described by Fresenius and Hintz, and is then treated with pure barium sulphate, the electric resistance of the solution gradually decreases from 0.000085 to 0.000020, and then remains constant, and since the electric resistance is proportional to the concentration, it follows that this saturated solution of barium sulphate contains 1 in 425,000 parts. This number agrees closely with that obtained by Kohlrausch, Rose, and Holleman.

The author also criticises the work of Fresenius and Hintz on the solubility of barium sulphate in various salts and acids, and comes to the conclusion that the results obtained by them are only qualitative, and that the solubility varies in accordance with the action of mass, and the reciprocal influence of electrolytes on solution.

E. C. R.

Volumetric Estimation of Lead. By ANTONIO LONGI and L. BONAVIA (*Gazzetta*, 1896, **26**, i, 327—403).—The authors have carefully examined most of the methods suggested for determining lead volumetrically, in order to ascertain whether any of them possess sufficient accuracy to replace the ordinary gravimetric methods.

Trials were made of Domonte's process (*J. pr. Chem.*, 1846, **38**, 306), which consists in titrating a lead salt, dissolved in excess of potash, with sodium sulphide solution, and of Casamajor's modification of the method (*Abstr.*, 1882, 776); the two methods are not to be recommended owing to the uncertainty of the end reaction.

Hempel's method (*Jahresb.*, 1853, 627) of determining lead by adding oxalic acid, separating the lead oxalate, and determining the oxalic acid either in the precipitate or in the solution by potassium permanganate, gives excellent results if certain precautions are taken. Considerable excess of oxalic acid must be added, and the solutions must be concentrated, lead oxalate being slightly soluble in water, but less so in oxalic acid solutions; the presence of even 0.066 per cent. of nitric acid interferes slightly with the determination of oxalic acid by permanganate. Alcohol should be added to the solution in which the precipitation is performed, and the precipitate should be washed with dilute alcohol, decomposed by sulphuric acid, and the oxalic acid titrated with permanganate.

Schwarz proposed (*Dingl. polyt. J.*, 1863, **169**, 284) to titrate lead solutions, in presence of sodium acetate, with potassium dichromate, determining the end of the titration by mixing drops of the super-

natant liquid with silver nitrate solution. Notwithstanding Schwarz's statement to the contrary, the authors find that the precipitate of lead chromate does not settle with sufficient rapidity for volumetric work; they find also that freshly precipitated lead chromate reacts with silver nitrate giving silver chromate, so that the indication of the end of the titration may be masked. The method gives low results.

The process described by Pellet (this Journal, 1877, i, 227), depending on precipitating the lead with a chromate and determining the excess of the latter volumetrically, is in several respects unsound, and therefore gives bad results. The authors propose the following modification of Pellet's method: Sodium acetate solution is added to the concentrated lead solution, and then standard potassium dichromate is run in until the liquid becomes decidedly yellow; the solution is filtered, and the precipitate washed with the least possible quantity of water. The filtrate is conveniently diluted, and 2 parts of 100 c.c. taken; to each of these is added 5 c.c. of sulphuric acid, and then a standard solution of ferrous ammonium sulphate until the solution is green with no trace of the yellow tint of the chromate. The excess of ferrous salt is then titrated with permanganate, and the quantity of lead in the original solution calculated. The test results are very satisfactory.

Diehl's method (Abstr., 1880, 752), in which the excess of dichromate added to a lead solution is determined by sodium thiosulphate, cannot be depended on; the equation $4\text{K}_2\text{Cr}_2\text{O}_7 + 3\text{Na}_2\text{S}_2\text{O}_3 + 13\text{H}_2\text{SO}_4 = 3\text{Na}_2\text{SO}_4 + \text{Cr}_2(\text{SO}_4)_3 + 4\text{K}_2\text{SO}_4 + 13\text{H}_2\text{O}$, which Diehl uses, is incorrect, so that the equivalent values of the thiosulphate must be found by titration against the dichromate.

Roux (Abstr., 1881, 849) has devised a method for determining lead volumetrically, which is widely used; it consists in precipitating the lead by potassium dichromate in presence of sodium acetate, and estimating the excess of dichromate by standard ferrous ammonium sulphate, using potassium ferricyanide as an indicator. The authors failed to get trustworthy results with this method as it stands, but the results are much improved by acidifying the filtrate from the lead chromate with sulphuric acid and running it into a definite quantity of standard ferrous salt, until the latter gives no reaction with ferricyanide, or reducing the chromic acid by adding standard ferrous solution and estimating the excess of the latter by titration with standard dichromate; very dilute potassium ferricyanide strongly acidified with sulphuric acid should be used as an indicator. Very satisfactory results are obtained by this modified process in dilute lead nitrate solutions, which are neutral or contain free acetic acid; the solution, however, should not contain acetates.

The method of titrating chromates by adding potassium iodide and hydrochloric acid and estimating the liberated iodine with thiosulphate (Mohr, *Zeits. anal. Chem.*, 1863, 2, 247) can be applied to the volumetric determination of lead; the titration with thiosulphate can be performed immediately after adding the hydrochloric acid. Sodium acetate is added to lead nitrate solution, and then excess of dichromate is run in; the lead chromate is filtered off,

washed, and the filtrate made up to a standard volume, in which the excess of dichromate is determined by potassium iodide and thiosulphate. The chromic acid in the precipitate may also be determined by dissolving it in caustic potash, diluting to a known volume, adding potassium iodide, then hydrochloric acid, and estimating the liberated iodine with thiosulphate; the results are excellent, but N/100 potassium dichromate should be used, or the solution must be so dilute that the green colour of the chromic salt does not interfere with the end reaction (compare Crismer, *Abstr.*, 1884, 1078).

The volumetric estimation of lead by titration with standard potassium ferrocyanide has been studied by Graeger (*Zeits. anal. Chem.*, 1865, 4, 438) and Yvon (*Abstr.*, 1889, 549). The authors add to a solution of lead nitrate not more than 3 per cent. of potassium nitrate, and then run in an excess of standard potassium ferrocyanide; the precipitate is filtered and washed with 3 per cent. potassium nitrate solution until the filtrate gives no reaction with ferric chloride. The ferrocyanide in the filtrate is determined by permanganate after acidification with sulphuric acid; the precipitated lead ferrocyanide, Pb_2FeCy_6 , also may be dissolved in sulphuric acid and titrated with permanganate. Care must be taken to avoid atmospheric oxidation of the ferrocyanic solution, but otherwise the method is a practicable and accurate one.

The authors have made many trials of Haswell's method (*Dingl. polyt. J.*, 1881, 241, 393), modifying it in various ways, but do not find it suitable for the volumetric estimation of lead. W. J. P.

Electrolytic Estimation of Iron, Nickel, and Zinc. By HUDSON H. NICHOLSON and S. AVERY (*J. Amer. Chem. Soc.*, 1896, 18, 654—659).—Iron when deposited from an alkaline tartrate solution generally contains a trace of carbon, which compensates somewhat for the incomplete precipitation. When citric acid is used, the amount of carbon is still larger. Formates or oxalates do not deposit any carbon. The author has found that, when using Classen's well-known ammonium oxalate process, the electrolytic precipitation of the metal is much facilitated by the addition to the solution (150 c.c.) of a saturated solution of borax (5 c.c.). Nickel has no tendency to carry down with it any carbon, and its electrolytic estimation is, on the whole, satisfactory. As regards zinc, the authors got very satisfactory results in the presence of formic acid partially neutralised with sodium carbonate; a compact, well adhering, evenly distributed, and metallic looking deposit was obtained.

L. DE K.

Sources of Error in Volhard's and similar Methods of Estimating Manganese in Steel. By GEORGE AUCHY (*J. Amer. Chem. Soc.*, 1896, 18, 498—511).—The author has made a large number of experiments on this process, and comes to the conclusion that the following are sources of error in Volhard's process.

(1) The incomplete neutralisation by zinc oxide, usually giving too high results. (2) The too sudden addition of the necessary excess of zinc, frequently giving results which are too low. (3) The titra-

tion in nitric acid solution, giving results about 0.01—0.02 per cent. too high. (4) Neutralisation by zinc oxide in hot solution, giving results which are too high.

In every case a blank experiment should be made, to ascertain the amount of manganese contained in the zinc oxide or other reagents.

The author prefers Stone's modification of Volhard's method as being easier and more rapid than the original. L. DE K.

Estimation of Lactose in Milk by double Dilution and Polarisation. By HARVEY W. WILEY and ERWIN E. EWELL (*J. Amer. Chem. Soc.*, 1896, **18**, 428—433).—The authors have endeavoured to determine the exact correction to be made for the volume occupied by the coagulum when clarifying the milk for polariscopic purposes.

Two portions of milk, of 65.82 grams each, are treated with 10 c.c. of solution of mercuric nitrate, prepared by dissolving the metal in twice its weight of nitric acid (sp. gr. 1.42), and diluting with 5 vols. of water. The one mixture is diluted to 100 c.c., the other to 200 c.c., and, after filtering, their respective rotations a and b are observed at 20°. The corrected rotation a' corresponding with a , allowance being made for the volume of the coagulum, is calculated from the equation $a' = \frac{ab}{a - b}$. The volume x of the precipitate is calculated from the equation $x = \frac{100(a - 2b)}{a - b}$.

L. DE K.

Toxicological Examination for Mercuric Cyanide. By DIOSCORIDES VITALI (*L'Orosi*, 1896, **19**, 80—87).—Mercuric cyanide would not be detected by the ordinary toxicological methods for detecting cyanides, because it is not decomposed by the feeble acids, such as tartaric acid, used to liberate the hydrogen cyanide.

The author proposes to use a method of detecting mercuric cyanide based on the fact that this salt is converted by magnesium into magnesium cyanide, which, when heated in aqueous solution, is wholly decomposed into magnesia and hydrogen cyanide. The material to be investigated is put into a retort, mixed with the liquid which accompanies it or, in default of this, with water, and magnesium dust is added; the retort is then heated on the water bath and the vapours caused to pass through very dilute caustic soda. If it is permissible to evaporate the contents of the retort to dryness, all the hydrogen cyanide can be driven off, but, if this be inadvisable, dilute acetic acid may be added to drive off the last traces of hydrogen cyanide. W. J. P.

Analysis of Wool-grease. By FERDINAND ULZER and HEINRICH SEIDEL (*Zeit. angew. Chem.*, 1896, 349—350).—The authors recommend the following process: 20 grams of potassium hydroxide is dissolved in 20 c.c. of water contained in a hemispherical dish of about 350—500 c.c. capacity. The solution is heated to boiling, and 20 grams of melted wool-grease is introduced with vigorous stirring. After boiling for another minute, the dish is placed on the water bath

until saponification seems complete; to make sure, however, the dish is placed for another two hours inside the water oven. The soap is then dissolved in 250 c.c. of boiling water, restoring from time to time the water lost by evaporation, and when completely dissolved 40 c.c. of hydrochloric acid, slightly diluted, is added. When the fatty mass is perfectly melted, it is, after cooling, removed, and then repeatedly boiled with water until the washings no longer show an acid reaction. After cooling, the fatty cake is removed, dried between blotting paper, and finally dried in the water oven. The total acidity number is then taken by means of Benedikt and Mangold's process. Three samples of Australian wool-grease gave, respectively, the figures 100.2, 102.9, and 101.9. Three South American samples gave the figures 96.4, 96.7, and 96.9.

To form an opinion on the genuineness of wool-grease, the authors also recommend taking the actual acidity number and the Reichert-Meissl number. Its iodine absorption may also be determined.

L. DE K.

A New Test for Asparagine. By L. MOULIN (*J. Pharm.*, 1896, 3, 543).—"Saccharin," warmed with sulphuric acid and a little resorcinol, turns yellowish-green, and if water is now added, and the mixture neutralised with ammonia or aqueous soda, a strongly fluorescent liquid is obtained. The author has found that a similar fluorescence of a fine green tint is produced when asparagine is treated in this way. The same reaction is also given by a crystalline compound, which the author has separated from a cold infusion of liquorice by means of dialysis.

L. DE K.

Test for Cinchona Alkaloids. By JAWOROWSKI (*J. Pharm.*, 1896, 3, 553; from *Pharm. Zeits. Russ.*, 1896, 6).—A mixture is made of equal parts of a 10 per cent. solution of sodium thiosulphate and a 5 per cent. solution of copper sulphate, and at once added drop by drop to 5 c.c. of the liquid to be tested. In presence of quinine, quinidine, cinchonine or cinchonidine, a yellow, amorphous precipitate is formed; if no precipitate is formed after the lapse of a minute, quinine, &c., is absent; the reagent itself giving a precipitate after a time.

The reaction takes place not only in aqueous solutions, but also in solutions made with chloroform, ether, or amylic alcohol.

L. DE K.

Estimation of Caffeine in Tea. By AUGUSTE PETIT and P. TERRAT (*J. Pharm.*, 1896, 3, 529—534).—The authors have found that the use of magnesia or lime is superfluous, and that the alkaloid may be completely extracted from tea by direct treatment with chloroform, provided the tea is moist; dry tea yielding but very little caffeine to chloroform. The following method is recommended. 25 grams of powdered tea is treated with thrice its weight of boiling water and, after 15 minutes, the whole is evaporated on the water bath until the liquid has disappeared, but the residue remains still visibly moist. It is then introduced into a percolator and repeatedly exhausted with

chloroform to extract the caffèine. The chloroform is distilled off, and the residue taken up with boiling water, which, on evaporation, will generally yield a residue sufficiently pure to be at once weighed.

If the alkaloid should be contaminated with chlorophyll, it must be treated with dilute sulphuric acid (1 : 10), filtered, neutralised with ammonia, and evaporated completely to dryness; the residue is then extracted with chloroform, and, after distilling off the latter, the pure caffèine can be weighed.

L. DE K.

Estimation of Nicotine and Ammonia in Tobacco. By VIKTOR VEDRÖDI (*Zeits. anal. Chem.*, 1896, **35**, 309—311).—A continuation of the controversy between the author and Kissling (see this vol., ii, 401). The author states that he used light petroleum and ethylic ether indifferently, having assured himself that the former “gave just as accurate results” as the latter. He reaffirms the fact of soda being carried over when Kissling’s own apparatus is employed. The fact that the addition of ammonium chloride did not influence the nicotine titration when working in the manner he proposes (*Abstr.*, 1895, ii, 541) he attributes to the complete volatilisation of the ammonia during the extraction with ether, the ether used being as free from water as possible, and the condenser being cooled with water of ordinary temperature.

With regard to the objection that the amido-compounds in tobacco would yield ammonia when boiled with soda, he considers that his experiments on this subject (*Abstr.*, 1894, 371) show that the decomposition of proteïds by soda is too imperfect to influence the estimation of nicotine and ammonia in tobacco. Moreover, in the fermentation which occurs during the manufacture of tobacco from the leaves, most of the amido-compounds and proteïds are destroyed. With regard to the errors of calculation imputed to him by Kissling, he ranges his “practical” results against the “theoretical” arguments of the latter.

M. J. S.

Distinction between Magenta and “Acid Magenta.” By PAUL CAZENEUVE (*J. Pharm.*, 1896, **3**, 595—597).—A well-known and very delicate reaction for the presence of aldehydes in commercial alcohol is based on the violet colour produced when the sample is mixed with a solution of a rosaniline salt which has been previously decolourised by the addition of sulphurous acid.

The author points out that magenta and “acid magenta” do not behave in the same way. The article consisting of rosaniline hydrochloride gives the coloration, whereas the sulphonated (S) compound does not, a fact which has been overlooked by Lefèvre.

L. DE K.

Examination of Red Wines for Foreign Colouring Matters. By ALBIN BELAR (*Zeits. anal. Chem.*, 1896, **35**, 322—323).—Most of the coal tar dyes give coloured solutions with nitrobenzene, whilst the natural blue and red vegetable colours are insoluble. To make the test, about 5 c.c. of the wine is shaken in a test tube with an equal volume of pure nitrobenzene, first gently, then violently, and if an emulsion

is produced it is caused to separate by warming. Rosaniline, purpurin, and safranine dissolve unchanged; methylene-blue is partially dissolved with an emerald-green coloration; eosin and rosolic acid both leave yellowish insoluble portions. Indigo carmine (sodium indigotin-disulphonate) is quite insoluble. M. J. S.

Quantitative Separation of Proteïds in Beer Wort. By N. C. HENRIK SCHJERNING (*Zeits. anal. Chem.*, 1896, **35**, 285—296).—The extended experience which the author has by this time acquired in the method of wort analysis suggested by him in 1894 (*Abstr.*, 1894, ii, 371; and 1895, ii, 428) has enabled him to systematise and simplify the operations so as to form a process of practical value. Six reagents are now employed, namely, stannous chloride, lead acetate, acetic acid, uranium acetate, ferric acetate, and magnesium sulphate. The stannous chloride is prepared by dissolving 50 grams of tin in hydrochloric acid, evaporating to 130 grams, diluting to 1 litre, and rapidly filtering. It must be kept in small stoppered bottles. The lead acetate solution is approximately a 10 per cent. one, containing 10—12 drops of 45 per cent. acetic acid to the litre. The acetic acid is made by diluting 15 c.c. of the 45 per cent. acid to a litre. The uranium acetate solution is a cold saturated one, obtained by cooling and filtering one prepared at a higher temperature. "Scale" ferric acetate is preserved in the dry state, and dissolved just before use, taking always 0.8 gram to 40 c.c. of the above acetic acid diluted with 100 c.c. of water.

The stannous chloride precipitate, which is regarded as albumin, is obtained by adding 5 c.c. of the reagent to 25 c.c. of wort, allowing the mixture to repose for 4—6 hours at the ordinary temperature, collecting on an 11-cm. extracted filter, washing twice with cold water without suction, and estimating the nitrogen according to Kjeldahl's method. No correction for solubility is needed. Lead acetate precipitates the albumin and denucleïn; about 6 c.c. of the reagent is added to 25 c.c. of wort, the mixture heated to boiling, and the precipitate collected immediately and washed with cold water. In consequence of its solubility, a correction of 0.15 c.c. of N/10 acid must be applied for each 100 c.c. of filtrate + washings. For the ferric acetate precipitation, the reagent prepared as above is heated to boiling and mixed with 20 c.c. of wort. After boiling again, the precipitate is collected and washed with boiling water. No correction for solubility is required. The precipitate contains the albumin, denucleïn, and propeptone. The uranium precipitate contains the above proteïds together with the peptone; 20—25 c.c. of the reagent is added to 25 c.c. of wort, the mixture boiled, and then left to cool until next day in a dark place. The precipitate is washed with cold 1—2 per cent. uranium acetate solution; an addition of 0.1 c.c. of N/10 acid is made for each 100 c.c. of filtrate and washings. In cases where the ferric acetate precipitate is obtained with difficulty, the albumin and propeptone are thrown down by magnesium sulphate; 20 c.c. of the wort, mixed with 5 drops of 45 per cent. acetic acid, is warmed in a water bath to 36°, and 18—20 grams of pulverised crystalline magnesium sulphate is dissolved in it by stirring. It is then left at the ordi-

nary temperature for $\frac{1}{2}$ —1 hour, filtered, and the precipitate washed with a cold saturated solution of magnesium sulphate containing 4—5 grams of 45 per cent. acetic acid to the litre. Zinc sulphate gives identical results (see Bömer, this vol., ii, 83). An experiment made with the dialysed solution of the magnesium sulphate precipitate showed that the presence of saline substances was essential to the precipitation by stannous chloride and ferric acetate, and yielded, moreover, some anomalous results, which up to the present the author has not been able to interpret.

M. J. S.

Estimation of Phosphorcarnic acid. By BALKE and IDE (*Zeits. physiol. Chem.*, 1895, **21**, 380—386).--In estimating phosphorcarnic acid by precipitation as carniferrin (see Abstr., 1895, i, 313) the use of ferric chloride entails the possibility of dissolving some of the precipitate by excess of the reagent; and ferric ammonium alum cannot be employed, as the aqueous solution, when boiled, deposits a small quantity of insoluble nitrogenous matter. The following process is found to yield concordant results.

The dilute meat-extract is heated, to coagulate albumin, and filtered, the phosphates present being then precipitated with calcium chloride and ammonia. The filtrate is neutralised, heated to boiling, and mixed with a 1 per cent. solution of ferric chloride, the latter being carefully delivered from a burette; when a slight excess has been added, the whole is boiled for about two minutes, the addition of ferric chloride being discontinued if the excess be permanent; the liquid is then neutralised with a few drops of ammonia, and finally separated from the precipitate by decantation, the latter process being employed in washing the sediment. The total nitrogen in the dry carniferrin is then estimated and calculated as carnic acid.

A. L.

General and Physical Chemistry.

Optical Rotation of Stereoisomerides. By PAUL WALDEN (*Zeits. physikal. Chem.*, 1896, **20**, 377—388).—As the effect of constitution on the optical rotation of stereoisomeric compounds had not been previously investigated, the author has determined this constant in the case of a number of compounds which are derived from fumaric and maleïc acids. The numbers obtained are given in the accompanying table.

Compound.	Specific rotation.	Molecular rotation.	Mol. ref.	Mol. ref. calc.
Amylic maleate	+ 4·62°	11·82°	70·29	69·89
Amylic fumarate	+ 5·93	15·17	70·89	69·89
Amylic chloromaleate . . .	+ 4·03	11·70	75·26	74·83
Amylic chlorofumarate ..	+ 5·78	16·78	75·53	74·83
Amylic bromomaleate . . .	+ 4·58	15·36	81·02	77·76
Amylic bromofumarate ..	+ 5·99	20·07	80·00	77·76
Amylic citraconate	+ 4·14	11·17	75·11	74·49
Amylic mesaconate	+ 5·93	16·01	75·52	74·49
Amylic itaconate	+ 4·97	13·42	74·92	74·49
Maleinöid amylic di- methylsuccinate	+ 3·42	9·79	79·08	79·48
Fumaröid amylic di- methylsuccinate	+ 3·66	10·47	79·40	79·48
Amylic mesotartrate	+ 4·77	13·83	73·54	73·32
Amylic racemate	+ 3·37	9·77	73·26	73·32

The rotation of the itaconate was also observed after the compound had hardened to a glassy mass, probably owing to polymerisation, but the rotation was practically unaltered. It appears from these results, that in these isomerides, the fumaric derivatives have, on an average, a molecular rotation 4·5° greater than that of the maleïc derivatives. The molecular refraction (Lorenz formula) is greater than that calculated, the differences being greater in the fumaröid compounds. (See Abstr., 1895, ii, 149; this vol., ii, 135, 137.)
L. M. J.

Behaviour of Argon and Helium when submitted to the Electric Discharge. By J. NORMAN COLLIE and WILLIAM RAMSAY (*Proc. Roy. Soc.*, 1896, **59**, 257—270).—The experiments described fall into two classes: the first series relates to the distance through which electric sparks from an induction coil will strike through argon and through helium at atmospheric pressure, contrasted with the length of the spark gap in other gases, and also with the pressure at which the spark discharge changes into a ribbon-like discharge in different gases.

The second series, which was made with the object of determining how much of one gas is detectable in its mixture with another at

different pressures, deals with the spectra of gases in electrodeless vacuum tubes.

In the first series, it was found that with argon the distance traversed by the spark is considerably greater than with air, oxygen, or hydrogen; whilst with helium, the spark is capable of passing through most unusual distances. Pure gases having been prepared, the results were:—Oxygen, 23·0 mm.; air, 33·0 mm.; hydrogen, 39·0 mm.; argon, 45·5 mm.; helium, probably 250—300 mm. The discharge in the case of helium was a ribbon of flame of a blue colour, not showing the yellow D_3 line very brightly.

It was then discovered that the spark discharge changes to a ribbon discharge at some definite pressure with all gases, and the following determinations were made.

Gas.	Pressure of changes of character of discharge.
Air	73 or 74 mm.
Hydrogen.....	42 or 43 „
Oxygen.....	81 „
Carbonic anhydride	92 or 94 „
Cyanogen	23 „
Nitrogen	33 „
Carbonic oxide	49 „
Helium	1270 „

Helium, therefore, presents a behaviour different from all other gases. In short, a tube like those termed “Pflücker’s tubes,” need not be filled with helium at a low pressure, but exhibits all the phenomena of a vacuum tube at ordinary atmospheric pressure.

In the second series, experiments were performed with the view of ascertaining whether the spectrum affords an adequate test of the purity of gases.

The following table shows the quantities of different gases visible in the mixtures of them.

- (1) Helium in hydrogen, 33·0 per cent. of helium invisible at 2·61 mm.
 „ „ 10·0 per cent. of helium barely visible at the lowest pressures.
- (2) Hydrogen in helium, 0·001 per cent. of hydrogen visible at all pressures.
- (3) Nitrogen in helium, 0·01 per cent. of nitrogen almost invisible.
- (4) Helium in nitrogen, 10·0 „ of helium difficult to detect.
- (5) Argon in helium, 0·06 „ still visible at all pressures.
- (6) Helium in argon, 33·0 „ invisible at 2·62 mm.
 „ „ 25·0 „ 0·58 „
- (7) Nitrogen in argon, 0·42 „ 0·17 „
 „ „ 0·08 „ 0·18 mm. although just visible at 1·05 mm.
- (8) Argon in nitrogen, 37·0 „ barely visible at any pressure.
- (9) Argon in oxygen, 2·3 „ difficult to distinguish at 1·04 mm.

The effect of oxygen is to greatly decrease the luminosity of the argon spectrum. The reduction of pressure has no effect in intensifying the spectrum. J. F. T.

Temperature Coefficient of the Electromotive Force of Silver Cells. By JOHAN M. LOVÉN (*Zeits. physikal. Chem.*, 1896, 20, 456—460).—The energy relations in a galvanic chain are given by the equation $\pi\epsilon = E + \epsilon T \cdot d\pi/dT$, where π is the E.M.F., ϵ the electricity developed, and E the total energy of the change. The temperature coefficient $d\pi/dT$ may therefore be either positive or negative according as the total energy is less or greater than the electrical energy. Measurements were made in the chain, silver | silver chloride in potassium chloride solution | potassium nitrate solution | silver nitrate solution | silver, and similar chains with bromide and iodide. The current and E.M.F. were determined, and also the heat of precipitation of silver chloride (which is the chemical change of the process), as well as the temperature coefficient, which was in each case found to be negative. The value for $\epsilon T \cdot d\pi/dT$ agreed fairly well with the difference between the electrical energy, and the heat of precipitation, as indicated theoretically. L. M. J.

Sublimation Temperatures in the Cathode-Light Vacuum. By FRIEDRICH KRAFFT and H. WEILANDT (*Ber.*, 1896, 29, 2240—2245; compare this vol., ii, 464).—In the former experiments, it was found that substances of high melting point no longer melt in the vacuum of the cathode-light, but directly sublime. The following sublimation points are given:—Anthracene, 103—104°; phenanthrene, 95—96°; chrysene, 169°; pyrogallol, 105—106°; caffèine, 116°; alizarin, 153—155°; retene, 135°; salicylic acid, 75—76°; camphoric acid, 163—164°; theobromine, 156°. Antipyrine distils at 141—142°. Codeïne boils at 179°.

The alkaloids were found to yield very pure products on distillation in the vacuum. Quinine boils at 170—180°; morphine at 191—193°. Indigo was found to sublime at 156—158° without decomposition; carbamide at 125°, and thiocarbamide at 98—99°. Uric acid did not sublime, but decomposed at 400°. J. F. T.

Solubility of Solids in Gases. By HENRYK ARCTOWSKI (*Zeits. anorg. Chem.*, 1896, 12, 413—416).—The author considers that in order to test the validity of the laws of solubility, the simplest cases should be first studied, in which the effect of the solvent is reduced to a minimum. The solution of a solid in a gas appears to be such a case, and the sublimation of a solid may be regarded as a case of a purely physical solution. L. M. J.

Sublimation Velocity of Mercury Haloid Salts. By HENRYK ARCTOWSKI (*Zeits. anorg. Chem.*, 1896, 417—426).—The velocities of sublimation of the halogen salts of mercury were determined by observing the loss of weight the salts experienced when kept at definite temperatures in a current of dry air. Mercuric chloride, bromide, and iodide, and mercurous chloride were examined, and curves constructed for temperature | loss of weight. The velocities of sublimation of the

three mercuric salts decrease as the molecular weight increases, whilst that of mercurous chloride is considerably less than even that of mercuric iodide, indicating probably a higher molecular weight, and the formula Hg_2Cl_2 , not HgCl . The curves for the three mercuric compounds closely resemble one another, differing only by a constant temperature difference, but the curve for calomel differs considerably from these. The velocity also appears to be dependent on the nature of the surface, and, for the same substance, decreases as the density increases. The velocities being measures of the vapour tension of the solid, may also be regarded as measures of the solubility of the solid in the gas (see preceding abstract).

L. M. J.

Sublimation Tension of Iodine. By HENRYK ARCTOWSKI (*Zeits. anorg. Chem.*, 1896, **12**, 427—430).—The sublimation tension of iodine at various temperatures has been previously determined at temperatures above 85° , and the author extends the observations to temperatures as low as 13° by measurement of the sublimation velocity. At 13° , this tension is only 0.1 mm. The velocity at a pressure of about 15 mm. was also determined, and, as expected, found to be considerably greater than at the ordinary atmospheric pressure.

L. M. J.

Determination of the Freezing Point of Dilute Aqueous Solutions. By A. PONSOT (*Compt. rend.*, 1896, **113**, 189—192).—The author discusses certain of the conditions under which the observed reduction of the freezing point of dilute solutions accurately represents the true reduction, having regard to the effects of the concentration of the solution, superfusion, the rate of cooling, and the velocity of the agitator. The general conclusion is that the most accurate result is obtained when the value of the rate of cooling (V_1) is zero (compare Abstr., 1894, ii, 342).

C. H. B.

Influence of Chemical Affinity on Solubility. By ST. TOLLOCZKO (*Zeit. physikal. Chem.*, 1896, **20**, 412—416).—Although the two components of a racemate show identical chemical properties, it was considered possible that a difference in solubility might exist if the solvent were itself an active compound. To determine whether this was so, a racemate was obtained in solution equilibrium with water and an active solvent, and then the solutions examined optically, to test for excess of either constituent. In the first case, racemic acid was used, the solvents being water and lævo-amylic alcohol, and in the second case mandelic acid, with ether and an aqueous solution of levulose. In both cases negative results were obtained, no excess of either active constituent entering into either solvent.

L. M. J.

The Lowering of Solubility. By ST. TOLLOCZKO (*Zeits. physikal. Chem.*, 1896, **20**, 389—412).—According to Nernst's law (Abstr., 1890, 1368), the relative lowering of the solubility of a solvent in a second liquid caused by the addition of a foreign substance is equal to the ratio of the number of dissolved molecules of the foreign

substance to the number of molecules of the solvent. The author endeavoured to prove the law by determining the effect of various organic compounds, insoluble in water, on the solubility of ethylic ether in water. The expression has to be somewhat altered, owing to the solubility of water in the ether, and an expression allowing for this is deduced. The experimental details are recorded, and the results for the molecular weight, calculated on the assumption of the law, are given in the accompanying table, in which the concentration is given in grams per 100 grams of pure ether, and the highest and lowest concentrations alone are recorded.

	Concentration 1.	Concentration 2.	Mol. wt. (1).	Mol. wt. (2).
Benzene	1·77	13·3	81·0	83·0
Toluene	1·77	13·25	87·0	85·0
Xylene	1·67	18·0	103·0	110·0
ψ-Cumene	2·98	—	116·0	—
Diamylene	1·15	20·3	134·0	149·0
Thymol	1·75	23·25	135·0	133·0
Borneol	1·93	4·17	139·0	156·0
Menthol	1·30	21·15	140·0	156·0
Chloroform	1·10	20·15	109·5	122·5
Carbon bisulphide	11·27	—	85·0	—

The results prove the validity of the law and its use for the determination of molecular weights, even at comparatively high concentrations. The solubility of ether was also determined at numerous temperatures, the value in grams of ether per gram of water being: 13°, 0·08930; 15°, 0·08399; 17°, 0·07955; 19°, 0·07494; 21°, 0·06948. The experiments also indicate the great effect of small quantities of impurities if the ether is only in small excess, the true values being only obtained when the excess of ether is great. L. M. J.

Influence of Pressure on Solubility. By ED. VON STACKELBERG (*Zeits. physikal. Chem.*, 1896, **20**, 337—358).—The author first investigates theoretically from the thermodynamical standpoint, expressions for the effect of pressure on solubility. A relation connecting the pressure and temperature effects is first established, and then a formula is deduced, which is independent of the temperature coefficient. By means of a Cailletet's pump, saturated solutions of sodium chloride, alum, and ammonium chloride were obtained at a pressure of 500 atmos., and small quantities were withdrawn and analysed. The pressure coefficients were hence obtained, and compared with those deduced theoretically. The results obtained for the three salts are as follows, the value d/x being the increase in milligrams per gram of solution for 100 atmos.

Salt.	d/x found.	d/x calc.
Sodium chloride	+1.2	+3.2
Ammonium chloride.....	-2.8	-3.7; -2.5
Alum	+6.7	+13.2

L. M. J.

Etherification. By HEINRICH GOLDSCHMIDT (*Ber.*, 1896, 29, 2208—2216).—The author, having previously suggested (this vol. i, 229) that the acceleration of the speed of etherification which occurs on adding a strong acid to an alcoholic solution of an acid is due to the presence of hydrogen ions, now brings further evidence in support of his view. If the speed of etherification be dependent on the extent to which the catalysing acid is dissociated, the addition of a salt of the latter should bring about a decrease in the velocity of etherification. It is found that, by adding paratoluidine picrate to an alcoholic solution of phenylacetic acid, picric acid being also added to serve as a catalyst, etherification is greatly retarded; the speed of etherification decreases as the quantity of paratoluidine picrate added is increased. The velocity constant k , calculated from the equation representing a monomolecular reaction, such as that supposed to occur during etherification, decreases gradually as the time increases, the decrease being much less in the experiments in which paratoluidine picrate is used than in those in which no salt is added. In the case of the latter, the decrease is caused by the water continually produced, but the retarding effect of the water is partially compensated when toluidine picrate is present, because the water partially decomposes the salt and so increases the available quantity of free acid.

An alcoholic solution of trichloroacetic acid slowly changes into ethylic trichloroacetate at ordinary temperatures; the author has studied the rate of change at 25°, and finds that, considering the reaction as a monomolecular one, the constant k decreases continuously with the time. The constant k decreases very slowly if the action be calculated as a bimolecular one, so that the etherification must, in this case, be the result of autocatalytic action, the reaction between the acid and alcohol being due to the presence of hydrogen ions resulting from the dissociation of the acid. The same result is obtained on recalculating Petersen's numbers (*Abstr.*, 1895, ii, 258) representing the velocity of etherification of formic acid dissolved in methylic alcohol.

It follows that etherification occurring, with or without the addition of a catalysing acid, is primarily caused by the activity of the hydrogen ions present, so that the various theories premising intermediate stages of the reaction in etherification are now unnecessary.

W. J. P.

Indirect Etherification. By EMIL PETERSEN (*Zeits. physikal. Chem.*, 1896, 20, 331—333).—The author considers that, although Tafel's explanation regarding the action of small quantities of hydro-

gen chloride in "indirect etherification" (this vol., ii, 470) is probably correct, it does not vitiate the availability of the method in those cases where it is desirable (Abstr., 1895, ii, 258). L. M. J.

Relation between the Colours of Atom, Ion, and Molecule.

II. By M. CAREY LEA (*Zeits. anorg. Chem.*, 12, 340—352; compare Abstr., 1895, ii, 441; this vol., ii, 594).—(1) Coloured inorganic substances composed of colourless ions yield colourless solutions; for example, take the colourless solutions of mercuric iodide in alcohol, and of antimony pentasulphide in alkaline sulphide solutions. This shows that in solution the ions are so far separated that their vibrations do not mutually influence each other. (2) There is no relation between the colour of a molecule and those of its constituent ions. Two colourless ions may give a coloured molecule, as in the case of bromine, and of silver sulphide; and coloured ions may give a colourless molecule, as in the case of the white metal nickel, the ions of which are green, or a molecule of a different colour, as in the case of red copper, the ions of which are blue. (3) The change of colour of the indicators used in acidimetry is not due to dissociation, for the colour of the alkaline solution, in which the dissociated sodium salt of the colour acid is supposed to exist, persists after the water has been evaporated off, and the possibility of dissociation thus removed. (4) The systems of arrangement of the elements proposed by Thomsen (Abstr., 1895, ii, 491; this vol., ii, 16) and de Boisbaudran (Abstr., 1895, ii, 440) have much in common with that of the author (Abstr., 1895, ii, 441). (5) The ions are not absolutely free in solution, but are subject to some kind of mutual restriction; for example, the chlorine ions of hydrochloric acid are unable to convert the ferrous ions of a solution of ferrous chloride into ferric ions until the hydrogen ions, by which they are accompanied, are removed by an oxidising agent. C. F. B.

The Origin of Dalton's Atomic Theory. By HEINRICH DEBUS (*Zeit. physikal. Chem.*, 1896, 20, 359—376).—The author contests several conclusions of Roscoe and Harden, published in the *New Views of Dalton's Atomic Theory*. He sums up his own conclusions as follows. (1) That in 1801, Dalton, from physical considerations, was led to the hypothesis that equal volumes of gases under normal conditions contain equal numbers of molecules, that is, $M/d = k$. (2) That it is highly probable that this hypothesis, together with his observations on the oxides of nitrogen, led him to formulate his atomic theory. (3) Atomic views led Dalton, in 1805, to abandon his hypothesis $M/d = k$. (4) Avogadro was probably aware of Dalton's views, and borrowed his hypothesis. L. M. J.

Twin-Elements. By RICHARD LORENZ (*Zeits. anorg. Chem.*, 12, 329—339).—The following 14 pairs of twins are said to exist among the elements, by twins being understood two elements with generally similar properties, and of which the atomic weights do not differ by more than 1.4 (usually about 1): B-C, Na-Mg, Al-Si, P-S, K-Ca, V-Cr, Mn-Fe, Ni-Co, Se-Br, Pd-Ag, Sn-Sb, I-Te, Ta-W, Pb-Bi.

It is also noticed that the atomic weight of a member of one twin pair differs from that of the corresponding member of the next twin pair by some multiple of 4 (the atomic weights being taken to the nearest integer), and that the other elements, which do not form pairs, also obey this law, so that these elements may be taken each as representing a twin pair, the other member of which is not known; exceptions are H, Be, N, Zn, Ga, Rb, Y, Zr, Nb, In, Cs, Ba, Ir, Au, and certain rare-earth metals, the atomic weights of which have not as yet been accurately determined. It is pointed out that, according to this system, tellurium should have a greater atomic weight than iodine, which is in accordance with the latest determinations. C. F. B.

Simple Method of Reducing Weight in Air to Weight in a Vacuum. By FRITZ SALOMON (*Zeit. angew. Chem.*, 1896, 529—531).—The author calls attention to the fact that chemists generally neglect to convert weight in air into weight in a vacuum, and describes a modification, suitable for placing in a balance case, of his "barothermometer" (*Zeit. angew. Chem.*, 1893 and 1894), an instrument which shows the weight of a litre of air at the atmospheric temperature and pressure at the time of observation. L. DE K.

Inorganic Chemistry.

Atomic Weights of Oxygen and Hydrogen. By EDWARD W. MORLEY (*Zeits. physikal. Chem.*, 1896, 20, 417—455).—The densities of the two gases having been previously determined (this vol., ii, 518 and 595), the question of the atomic weights was next considered.

The first method was similar to that of Leduc (*Abstr.*, 1892, 1388), that is, was dependent on the determination of the density of the mixed gases evolved by the electrolysis of an alkaline solution. One point observed in the researches was the capability which air possesses of creeping between the mercury and the glass into the eudiometer if the mercury is not covered by a layer of sulphuric acid. In all the analyses of the electrolytic gas, the hydrogen was found to be present in slight excess, the average for the series being 0.000293 (= excess / total gas). This has to be allowed for in the calculation, and was probably overlooked by Leduc. The density of the mixed gases was thus obtained as $D = 0.535510 \pm 0.000010$ (gram / litre). The ratios of the volumes of oxygen and hydrogen in the mixture were then calculated on the assumption of Van der Waals' equation, and found to be 1 : 2.00357, yielding the ratio for the combined volumes = 1 : 2.00269.

The second method was by means of the synthesis of water by the combination of weighed quantities of the gases. The oxygen was weighed as in the density determinations, and the hydrogen by the loss of a charged palladium tube, and the uncombined residue was in all cases eudiometrically analysed. The mean value

for the ratio of the atomic weights obtained from the weights of the two gases was 15·8792, and from the weights of hydrogen and water 15·8785, whilst that calculated by the first method is also 15·879, which is, moreover, the mean value of the results of Dittmar and Henderson (15·866, 15·868), Cooke and Richards (15·869), Ledue (15·881), Rayleigh (15·89), and Noyes (15·897). The value $O = 15·879$ is hence at present the most probable value for the atomic weight.

L. M. J.

Replacement of the Chlorine in Chlorides of Non-Metals and Metalloids by Bromine and Iodine. By H. LLOYD SNAPE (*Chem. News*, 1896, **74**, 27—29).—In many experiments, various non-metallic chlorides were heated in sealed glass tubes in a paraffin bath with excess of the metallic haloid salt, the objects being to heat the dry materials out of contact with the air, to watch for any decomposition and to adjust the temperature accordingly, and to avoid inconvenience arising from the presence of any undecomposed non-metallic chloride in the final product. In this way, with potassium bromide, phosphorus trichloride was apparently unchanged at 200—220°, carbon tetrachloride (like silicon tetrachloride) was but little attacked at 200°, whereas sulphur monochloride at 200—220° and arsenic trichloride at 180—220° were partially converted into bromides. With potassium iodide, both sulphur monochloride and carbon tetrachloride were more completely decomposed, the former even at ordinary temperatures, the latter at 200°, but yielded only mixtures of sulphur and iodine, and carbon and iodine respectively, whilst phosphorus trichloride at 200°, arsenic trichloride at 240°, and antimony chloride at 200° were readily converted into their iodides. A repetition of Guthrie's experiment with sulphur monochloride and ethylic iodide also yielded a mixture of sulphur and iodine. Antimony trichloride too could be converted into antimony tribromide by passing the vapour over a long layer of potassium bromide heated to a temperature sufficiently high to decompose the double salt.

D. A. L.

Nitrosodisulphonic acid and its Salts. By PAUL SABATIER (*Compt. rend.*, 1896, **123**, 255—258).—A solution of nitrososulphonic acid or sodium nitrite in sulphuric acid is reduced not only by cuprous and ferrous salts (this vol., ii, 599, 622), but also by a large number of other substances, with production of the blue nitrosodisulphonic acid. Mercury acts very rapidly, but also readily decomposes the nitrosodisulphonic acid. Finely divided silver, tin, and aluminium behave in the same way, and so also do cadmium, antimony, and lead, although much more slowly. Zinc, even in powder, bismuth, chromium, uranium, sulphur, phosphorus, nickel, arsenic, thallium, and magnesium react more or less readily, but do not produce the blue compound. Selenium and tellurium behave as with sulphuric acid alone. Arsenious anhydride, antimonious, manganous, and stannous oxides, mercurous and chromous chlorides, carbon bisulphide, and arsenic, bismuth, tin, and zinc sulphides, potassium ferrocyanide, carbamide, and oxalic, tartaric, and citric acids give no distinct result. On the other hand, the blue product is

readily produced by zinc phosphide or arsenide, and by barium hypophosphite, less readily by lead sulphide and stannous chloride. Alcohol, ether, glycerol, and even acetic acid will produce a blue ring if added to the nitrososulphonic acid solution.

The salts are more stable than the acid (*loc. cit.*), and if a cupric salt or a ferric salt is dissolved in the nitrososulphonic acid solution, and the reducing agents are then allowed to act, the colour produced is much more intense, and it is observed with substances such as arsenic and zinc sulphides, bismuth, zinc powder, &c., which do not seem to act under ordinary conditions.

Sulphurous anhydride reduces the nitrosulphonic acid only in presence of water. The blue compound is formed, for instance, if sulphurous anhydride is dissolved in sulphuric acid diluted with one-third of its volume of water, and this liquid is added to an equal volume of the nitrosulphonic acid solution. The copper salt is formed by adding copper nitrite to a solution of sulphurous anhydride in sulphuric acid containing a small quantity of water.

When nitric oxide is passed into a solution of cupric sulphate in sulphuric acid, the blue compound is formed as Desbassins and Richmond have observed. Nitrosulphonic acid is formed as well as cupric nitrosodisulphonate, $3\text{NO} + \text{CuSO}_4 + \text{H}_2\text{SO}_4 = \text{NO}(\text{SO}_3)_2\text{Cu} + 2\text{NO}_2\text{SO}_3\text{H} + 2\text{H}_2\text{O}$, and on adding a cuprous salt a further quantity of the cupric nitrosodisulphonate is produced. Ferric sulphate behaves like cupric sulphate. The red-violet compound is produced still more readily when the nitric oxide is passed into a solution of ferrous sulphate in sulphuric acid, part of the ferrous salt being oxidised. The nitric oxide has no action on sulphuric acid alone, nor on solutions of chromic or manganic sulphate in the acid.

C. H. B.

Preparation of Selenic acid. By R. METZNER (*Compt. rend.*, 1895, **123**, 236—238).—When excess of potassium permanganate is added to a solution of selenious acid, complete oxidation takes place, the products being selenic acid and potassium selenate, which remain in solution, and manganese sesquioxide, which is completely precipitated if the solutions are dilute. After removal of the manganese oxide, the potassium can be precipitated by means of hydrofluosilicic acid.

A better method is to employ permanganic acid, obtained from pure barium permanganate. The solutions should be dilute, and it is best to add the selenious acid to the permanganic acid. After removal of the manganese oxide and concentration of the wash water, a small quantity of permanganic acid is added to oxidise the trace of selenious acid that remains and to precipitate a small quantity of manganese that has dissolved. Sometimes it is necessary to heat the liquid to boiling, but the manganese oxide separates immediately on the addition of a drop of selenious acid solution. Finally permanganic acid is added until the liquid shows a persistent pink tinge in a column 20 cm. thick, and the liquid is concentrated, preferably under reduced pressure. An acid can be obtained, which corresponds almost exactly with the composition H_2SeO_4 .

C. H. B.

Metallic Compounds of Triphosphoric acid. By MARTIN STANGE (*Zeits. anorg. Chem.*, 1896, **12**, 444—463).—Sodium triphosphate, $\text{Na}_3\text{P}_3\text{O}_{10} + 8\text{H}_2\text{O}$, is obtained by heating sodium pyrophosphate with sodium metaphosphate, or better, sodium pyrophosphate (111.8 parts) with phosphate (73.1 parts) at a bright red heat for 20—30 minutes. The melt becomes warm when dissolved in water, and part of the triphosphate is decomposed into pyro- and meta-phosphates. The salt is obtained pure by adding water to the mother liquors of the melt, which solidify on cooling, and either separating the salt by filtration or by spreading it on a porous plate. The product is a fine powder consisting of four-sided leaflets, and is quite free from metaphosphoric acid. It is decomposed by heat, acids, and bases, as already described by Schwarz (Abstr., 1895, ii, 445). When treated with strong ammonia, it forms a white emulsion, and then an oil is precipitated, which is a concentrated solution of metaphosphate. Schwarz states that orthophosphate is formed by the action of ammonia; but the author was unable to obtain orthophosphate even by boiling the mixture.

The properties of cobalt, nickel, and zinc triphosphates, $\text{CoNa}_3\text{P}_3\text{O}_{10} + 12\text{H}_2\text{O}$; $\text{Zn}_2\text{NaP}_3\text{O}_{10} + 9\frac{1}{2}\text{H}_2\text{O}$, have already been described by Schwarz. He obtained the cobalt and nickel salts, however, only after the mixture had been allowed to remain some time; a similar result was obtained by the author when working with sodium triphosphate containing metaphosphate, but when pure materials were used, a precipitate was at once formed.

Ferrotrisodium triphosphate, $\text{FeNa}_3\text{P}_3\text{O}_{10} + 11\frac{1}{2}\text{H}_2\text{O}$, is obtained by adding sodium triphosphate to a solution of ferrous sulphate. The solution, after filtration, deposits the salt in slender, silky, white needles. It is stable when dry, but in contact with water rapidly oxidises and forms a brown syrup, which probably consists of a basic salt. It dissolves in nitric acid, and, on warming, is converted into ferric pyrophosphate with a very violent evolution of nitric oxide. It is dehydrated only by heating to the melting point, and ferrous oxide is then deposited. The author was unable to obtain the corresponding ferric salt, probably because it is very easily soluble in water, and thereby undergoes decomposition.

Magnesium trisodium triphosphate, $\text{MgNa}_3\text{P}_3\text{O}_{10} + 13\text{H}_2\text{O}$, is obtained by adding a solution of magnesium chloride to one of sodium triphosphate until a permanent precipitate begins to form; this is quickly redissolved by the addition of sufficient triphosphate, and the salt then at once commences to separate. It crystallises in very slender needles, is decomposed by exposure to air, losing water of crystallisation, and, when heated, intumesces like borax, and melts at a red heat to a clear glass easily soluble in acids.

Manganese trisodium triphosphate, $\text{MnNa}_3\text{P}_3\text{O}_{10} + 12\text{H}_2\text{O}$, is obtained by mixing a solution of manganese sulphate with sodium triphosphate. It crystallises in slender, white prisms, loses its water of crystallisation only when heated to redness, and then melts to a colourless glass which is easily soluble in sulphuric acid.

Tricopper sodium pyrophosphate, $\text{Cu}_3\text{Na}_2\text{P}_4\text{O}_{14} + 10\text{H}_2\text{O}$, is obtained by mixing a solution of sodium triphosphate with copper sulphate

until a permanent precipitate is obtained. It is a white, crystalline powder, quite insoluble in water, and when heated becomes blue, green, then yellowish-green, and sinters at a high temperature. Even after heating, it is soluble in nitric and hydrochloric acids.

Cupric trisodium triphosphate, $\text{CuNa}_3\text{P}_3\text{O}_{10} + 12\text{H}_2\text{O}$, is obtained by mixing sodium triphosphate and copper sulphate in the theoretical proportions. It crystallises from the solution, after 1 to 2 days, in lustrous, bluish-green prisms. When heated, it melts in its water of crystallisation, and at a red heat is converted into a glass which, when hot, is yellow, when cold, bluish-green, and is easily dissolved by acids.

Lead triphosphate-sodium pyrophosphate, $\text{Pb}_5\text{Na}_4\text{P}_8\text{O}_{27} + 10\text{H}_2\text{O}$, is obtained by adding a neutral solution of lead nitrate to a solution of sodium triphosphate until a permanent precipitate is produced, and then dissolving the latter by the addition of more triphosphate. It crystallises in yellowish nodules, and melts, when heated, to a colourless glass, which is easily soluble in nitric acid. An amorphous lead salt is obtained by employing an excess of lead nitrate; it has not, however, a constant composition, and contains sodium which cannot be eliminated by prolonged washing. When the salts are allowed to react with one another for some time, the analysis of the product approaches that of lead triphosphate. From dilute solution, however, and when the precipitate is at once separated, the product appears to be lead pyrophosphate contaminated with metaphosphate. The filtrate from the precipitate contains lead and phosphoric acid, so that apparently an excess of lead salt decomposes the triphosphate.

Trisilver sodium pyrophosphate.—The action of silver nitrate on sodium triphosphate is very similar to that of lead nitrate, and complicated pyrophosphates are obtained, which the author was unable to isolate. A salt of the composition $\text{Ag}_3\text{NaP}_2\text{O}_7 + \frac{1}{2}\text{H}_2\text{O}$, which is probably formed in the above reaction, is obtained by treating a saturated solution of sodium pyrophosphate with silver nitrate, when it is precipitated as a heavy, crystalline powder, together with amorphous silver pyrophosphate. When strongly heated, it melts to a brown liquid, which, on cooling, forms a lemon yellow, crystalline mass containing orthophosphate.

Chromium salts give no precipitate with triphosphate, but with a mixture of molecular proportions of meta- and pyro-phosphates, a green precipitate is obtained. With manganese salts, triphosphates yield a crystalline precipitate of triphosphate, whilst with the mixed phosphates an amorphous precipitate is formed, and only after remaining some weeks, a small quantity of crystalline manganese trisodium triphosphate. Cadmium salts give no precipitate with a solution of triphosphate, and with a solution of the mixed phosphates, a precipitate of small crystals. From the above results, the author concludes that the triphosphates are chemical compounds, and not double salts of pyro- with meta-phosphoric acid.

E. C. R.

Artificial Production of Diamonds. By HENRI MOISSA (*Compt. rend.*, 1896, **123**, 206—210).—Iron was carburetted and fused in the electric furnace and allowed to fall into mercury 10 cm.

deep covered with water 20 cm. deep. The irregular shaped granules thus obtained were saturated with carbon, but contained none of high sp. gr.; the spheres or ellipsoids formed at the same time contained, however, both black diamonds and transparent diamonds, some of which, although microscopic, showed remarkable regularity of crystalline form.

Larger masses of the fused carburetted iron were allowed to fall into water and mercury at the bottom of a pit shaft 32 metres deep, but the conditions of the experiment were not favourable to the production of spherical masses of iron. It was observed that when the falling globules touched the tub containing the mercury, or came in contact with the earth they broke up, with a flame, into scintillating globules, the change being accompanied by a report like that of a rifle. It was also observed that even during the short time occupied by the fall, the temperature of the globules was materially reduced.

In other experiments, the fused carburetted iron was run into a small cylindrical cavity in a large mass of iron or copper. Under these conditions, the fused metal is very rapidly cooled, and diamonds are obtained mixed with graphite, but the yield is not very satisfactory.

C. H. B.

Black Diamonds. By HENRI MOISSAN (*Compt. rend.*, 1896, **123**, 210—211).—The black matter, or so-called black diamond, included in transparent diamonds from Brazil, is composed of a variety of carbon different from diamond. When such diamonds are powdered and heated in oxygen at a temperature 200° below the ignition point of the diamond, the black matter burns away with production of carbonic anhydride, and the residual diamond is quite white.

C. H. B.

Homogeneity of Argon and Helium. By WILLIAM RAMSAY and NORMAN COLLIE (*Compt. rend.*, 1896, **123**, 214—216, and also *Nature*, 1896, **54**, 546).—In each case the gas was allowed to diffuse through a small tube of porous earthenware into a vacuum, and was submitted to several successive fractionations in this way. Direct experiment showed that the process permits of the separation of helium from hydrogen, and carbonic anhydride from oxygen, and that by observing the rate of descent of a column of mercury connected with the apparatus, a fairly accurate determination of the sp. gr. of a gas may be made.

In the case of argon, several fractionations resulted in two portions of the gas being obtained of sp. gr. 19.93 and 20.01 respectively, and it follows that little or no separation is effected.

In the case of helium, on the other hand, the gas was separated into two portions of sp. gr. 1.874 and 2.133 respectively, and repeated fractionation of each of these portions failed to alter these figures. Determinations of the refractive indices of the two gases by Lord Rayleigh gave for the lighter 0.1350 (air = 1), and for the heavier 0.1524, the two values being almost exactly proportional to the sp. gr. of the gases. Both fractions of helium gave absolutely the same spectrum. It is, therefore, impossible to say that one fraction is a mixture, whilst the other is homogeneous.

Having regard to the fact that the spectra of the two gases are identical, that the refractive indices of known gases of different chemical composition are not proportional to their sp. gr., and that it is improbable that there should be two different gases with nearly the same sp. gr., the authors suggest that in their experiments they may have separated light molecules of helium from heavy molecules of helium.

C. H. B.

Quick Nitrogen Absorbent for the Liberation of Argon and the Manufacture of Metallic Lithium. By HENRY N. WARREN (*Chem. News*, 1896, **74**, 6).—Dry lithium hydroxide is heated in a tubulated iron retort, metallic magnesium being added in small pieces from time to time through the tubulure; metallic lithium distils over. The carbonate may be used, but then the metal is contaminated with carbide, which evolves acetylene in contact with water.

A material which absorbs nitrogen with great avidity is obtained by the reduction, in an atmosphere of hydrogen at as low a temperature as possible, of a mixture of magnesium powder with calcium or barium hydroxide, saturated with a strong solution of lithia.

D. A. L.

Alloys. By HENRI GAUTIER (*Compt. rend.*, 1896, **123**, 172—174).—The author has determined the melting points of a number of alloys with the object of ascertaining whether there is a group of alloys containing two metals which are not isomorphous, but which form an alloy isomorphous with one of them, and are, therefore, analogous to ammonium ferric chloride, sodium silver chloride, or calcium sodium sulphate. In the following table, the compositions of the alloys are given in per cents. of the less fusible constituent.

Cd-Ag.	M. p.	Zn-Ag.	M. p.	Sn-Ag.	M. p.	Sb-Ag.	M. p.	Cu-Ni.	M. p.
0·0	322°	0·0	433°	0·0	232°	0·0	632°	0·0	1050°
4·0	355	6·25	465	4·86	221	5·0	613	0·5	1045
10·6	422	30·0	595	16·66	312	10·0	590	20·0	1250
21·75	525	52·17	695	25·0	355	25·0	560	33·33	1310
36·23	660	58·0	715	33·33	390	33·33	540	50·0	1340
42·0	710	62·0	690	40·0	430	50·0	495	55·55	1370
51·0	755	72·50	695	50·0	475	55·0	482	66·66	1400
60·16	805	76·60	730	58·82	535	60·0	492	100·0	1450
68·65	840	89·54	870	66·66	600	66·6	525	—	—
77·63	880	94·24	910	74·62	682	75·0	583	—	—
86·1	925	100·0	954	83·33	815	83·33	750	—	—
91·8	945	—	—	90·90	900	90·9	885	—	—
95·5	950	—	—	100·00	954	100·0	954	—	—
100·0	954	—	—	—	—	—	—	—	—

In the case of the silver-cadmium, silver-zinc, and silver-tin alloys, the variations in the melting points are not analogous to those observed in the case of the salts previously referred to. Further, whilst, as a rule, the addition of a small quantity of metal to another more fusible metal lowers the melting point, the reverse is the case with silver and cadmium, and silver and zinc. The melting points of

tin and bismuth are raised by the addition of small quantities of antimony, which is isomorphous with bismuth. The immediate raising of the melting point of the more fusible of the two constituents of the alloy seems to be intimately related to the phenomena of isomorphism.

The curve of the melting points of the copper-nickel alloys indicates the formation of a compound, CuNi , whilst the corresponding curve for the silver-antimony alloys indicates that they are simply mixtures.

C. H. B.

Magnesium Cobaltite. By E. DUFAU (*Compt. rend.*, 1896, 123, 239—240).—When an intimate mixture of 150 grams of cobaltic oxide, Co_2O_3 , and 75 grams of magnesium oxide is heated for 10 minutes in the electric furnace with an arc from 300 ampères and 70 volts, *magnesium cobaltite*, CoO_3Mg , is obtained as a very deep, garnet-red, crystalline mass of sp. gr. 5.06 at 20° . Its hardness is between 4 and 5. The cobaltite is dissolved by hydrofluoric acid, by hydrochloric acid with evolution of chlorine, and by nitric and sulphuric acids with evolution of gas, and it is also decomposed and partially dissolved by ammonia. Oxygen is without action on it at a red heat, but sulphur converts it into cobalt sulphide at a lower temperature. Chlorine attacks it with production of cobaltous chloride, which sublimes, and bromine behaves similarly, but iodine seems to have no action. Dry hydrogen fluoride and dry hydrogen chloride also decompose it readily, but fused oxidising agents have no action on it.

C. H. B.

Electro-Chemical Method of preparing Metallic Hydroxides. By RICHARD LORENZ (*Zeits. anorg. Chem.*, 1896, 12, 436—441).—A bath of potassium or sodium chloride, sulphate, or nitrate, dissolved in water, is used according to the ease with which the several hydroxides are formed in these solutions. The cathode consists of a platinum plate, and the anode of a plate of the metal whose hydroxide is to be prepared. The electrolyte is continually stirred, and the metallic hydroxide is obtained as an insoluble precipitate. An anode of copper in a solution of potassium chloride, gives a yellowish-red precipitate of cuprous hydroxide, and in a solution of potassium nitrate, a blue precipitate of cupric hydroxide. Silver, magnesium, zinc, cadmium, aluminium, lead, manganese, and iron, when treated by this method, are easily converted into their hydroxides. Mercury gives no precipitate when treated in a bath of potassium chloride, calomel being formed; in a bath of potassium nitrate, a black precipitate is obtained. Thallium, when treated in baths of the potassium salts, becomes covered with a coat of suboxide, and a brown precipitate of thallium hydroxide is very gradually formed. Tin, when treated in a bath of chloride, sulphate, or nitrate, yields orthostannic acid, which, by this method, is easily obtained pure. Antimony and bismuth, treated by this method, become coated with a grey skin, and no hydroxides are formed. Nickel, in a bath of the nitrate, becomes quickly coated with a black skin; in a bath of the chloride, the green hydroxide is very easily obtained.

The method is applicable to the preparation of hydroxides which are insoluble in water; hydroxyl ions and metal ions are formed in equivalent proportions, and therefore the hydroxide is obtained in neutral solutions, and this is a great advantage over the chemical method, where it is necessary to wash the hydroxides free from alkali. Since the precipitated hydroxides are formed in the solution, and not at the cathode or anode, the latter do not become foul, and a large quantity of the hydroxide can be prepared with the same strength of current and solution. It is important that the anodes should be made of pure metal, as it is the impurities in the metal alone which can contaminate the hydroxides prepared by this method. E. C. R.

Electro-Chemical Method of preparing Metallic Sulphides. By RICHARD LORENZ (*Zeits. anorg. Chem.*, 1896, **12**, 442—443).—The method is similar to that described in the preceding abstract for the preparation of metallic hydroxides. A cathode of copper sulphide is employed, and an anode of the metal whose sulphide is to be prepared. The bath consists of a solution of potassium or sodium chloride, nitrate, or sulphate. Copper, silver, cadmium, tin, lead, iron, and nickel sulphides are easily obtained. The method is evidently of general application, and is very convenient, as the metallic sulphides are formed in neutral solution and without using hydrogen sulphide or alkali sulphides. E. C. R.

Action of Hydrogen Sulphide on Solutions of Cupric Salts. By BOHUSLAV BRAUNER (*Chem. News*, 1896, **74**, 99; compare Coppock, this vol., ii, 562).—Investigations have been made on the complete precipitation with a slow or rapid current of hydrogen sulphide, of aqueous solutions of cupric sulphate or chloride under varying conditions of dilution, acidity, and of temperature. The resulting precipitate, greenish-black or dark olive green in colour, was washed thoroughly and successively with hydrogen sulphide solution, alcohol, carbon bisulphide, alcohol, and ether, the air being rigorously excluded throughout by means of carbonic anhydride. The washed and unwashed precipitates have been analysed; the latter always consisted of copper, combined sulphur, and free sulphur, whilst the former was neither simply Cu_4S_3 nor CuS , but apparently contained varying proportions of CuS and Cu_2S . The exact conditions under which the larger proportion of one or the other is produced are not yet known, and are to form the subject of future experiments. It is suggested that the formation of sulphoxy-compounds of copper may have something to do with the reaction. D. A. L.

Mercuric Oxy-salts. By RAOUL VARET (*Compt. rend.*, 1896, **123**, 174—176).—Raoult and Guinchant have shown that mercuric oxy-salts do not exist in their solutions in the form of basic salts, and the author has endeavoured to determine whether they exist as normal or acid salts. Berthelot has shown that the thermal effect of the substitution of one metal for another in a saline solution is equal to the difference between the respective heats of formation of the initial and final compounds, and, on the other hand, Andrews, and Favre and

Silberman have shown that the amount of heat developed by the substitution of one metal for another in a saline solution is independent of the nature of the acid radicle. Berthelot's determinations, however, prove that this law does not hold good for mercuric chloride, bromide, or cyanide.

On the other hand, Berthelot's determinations show that in a solution of the acetate, the displacement of potassium by mercury develops +164·9 Cals.; the determinations of Berthelot and of the author show that in solutions of the picrate a similar displacement likewise develops +164·9 Cals. In the case of the nitrate, the displacement develops +165·0 Cals., and it follows that mercuric oxy-salts obey the law of thermochemical moduli, and that the nitrate exists in solution as the normal salt.

According to Berthelot, the heat of formation of potassium hydrogen sulphate, dissolved in dilute sulphuric acid, is -2·6 Cals. less than the heat of formation of the normal sulphate. The author has found that the heat of formation of mercuric sulphate, dissolved in dilute sulphuric acid, is +170·0 Cals., and hence the displacement of potassium by mercury in such a solution will develop +165·0 Cals., exactly as in the case of other mercuric oxy-salts. It follows that mercuric sulphate, dissolved in excess of dilute sulphuric acid, is present in the form of a hydrogen salt, strictly comparable with the corresponding sodium and potassium salts. C. H. B.

Artificial Dendrites. By HENRYK ARCTOWSKI (*Zeits. anorg. Chem.*, 1896, 12, 353—357).—Solutions of mercuric chloride, of concentration varying from 10—0·1 per cent., were left for three months in contact with marble at 39°. The oxychloride, $\text{HgCl}_2 \cdot 4\text{HgO}$ (Abstr., 1895, ii, 393), separated in definite crystals from the stronger solutions; in more or less parallel, but slightly interlacing plates, from the solutions of medium strength, the plates being seen under the microscope to be built up of small cubes; and in dendritic growths, precisely resembling those of native copper, from the weaker solutions. That better crystals are got from the stronger solutions is correlated with the fact that the oxychloride in question is more soluble in these solutions; it is quite insoluble in pure water. C. F. B.

Mercurous Nitrite. By P. C. RAY (*Zeits. anorg. Chem.*, 1896, 12, 365—374).—This substance, $\text{Hg}_2(\text{NO}_2)_2$, is obtained by diluting yellow nitric acid, of sp. gr. 1·41, with 3 parts of water, and allowing it to remain for one or two days, best at a temperature of about 30°, in contact with a large excess of mercury; the nitrite is deposited on the surface of the metal in the form of yellow needles. It is decomposed but slowly by dilute sulphuric acid in the cold, nitrous fumes being evolved; boiling with a large excess of water decomposes it to the extent of about 78 per cent. into mercury and mercuric nitrite. The author discusses the bearing that the formation and properties of mercurous nitrite have on the constitution of nitrites and the action of metals on nitric acid; he thinks that in it the metal is directly united to nitrogen, as in the nitrites of silver, copper, and bismuth.

C. F. B.

Lanthanum Carbide. By HENRI MOISSAN (*Compt. rend.*, 1896, 123, 148—151).—Lanthanum oxide is easily reduced by carbon in the electric furnace, although the temperature required is somewhat higher than in the case of cerium oxide. A mixture of lanthanum oxide with four-fifths its weight of sugar carbon is placed in a carbon tube closed at one end, and heated in the electric furnace with a current of 350 ampères and 50 volts. The product is *lanthanum carbide*, C_2La , which is distinctly crystalline, and is transparent and yellow in thin slices; sp. gr. = 5.02 at 20°. It is not attacked by fluorine at the ordinary temperature, but burns brilliantly in it when gently heated; it also burns in chlorine at 250°, and in bromine and iodine vapours at 255°. When heated to redness in oxygen, it burns completely, but remains practically unaffected by sulphur vapour at the softening point of glass, or by phosphorus vapour at 700—800°. Selenium vapour, on the other hand, converts the carbide into a selenide. Nitrogen at 700—800° has little effect on it, but the residue evolves small quantities of ammonia when fused with potassium hydroxide. Carbon dissolves in the fused carbide, but separates as well crystallised graphite on cooling. Fuming nitric acid has no action on the carbide, but concentrated sulphuric acid is reduced when heated with it; dilute acids decompose it readily. When heated in nitrous or nitric oxide, the carbide burns vigorously; it is also decomposed by hydrogen chloride below a dull red heat, and fused oxidising agents attack it readily.

When mixed with water, lanthanum carbide is rapidly decomposed at the ordinary temperature, with evolution of a gas which contains about 71 per cent. of acetylene, 1 to 2 per cent. of ethylene, and 27 to 28 per cent. of methane. Small quantities of liquid and solid hydrocarbons are formed at the same time. C. H. B.

Action of Mercury Salts on Aluminium. By PERCY A. E. RICHARDS (*Chem. News*, 1896, 74, 30—31).—Salts of mercury, or the metal itself, when brought into contact with aluminium, give rise to filamentitious excrescences of alumina, seemingly caused by the formation of an aluminium amalgam and its subsequent reaction with the moisture of the air. The excrescence reappears after washing and wiping, if the mercury has once obtained a firm hold. D. A. L.

Preparation of Potassium Permanganate by Electrochemical Means. By RICHARD LORENZ (*Zeits. anorg. Chem.*, 1896, 12, 393—395).—A solution of potassium permanganate can be prepared by passing a current of 1.5 volt potential between an anode of commercial manganese or of ferromanganese (containing 20—25 per cent. of iron) and a cathode of porous copper oxide (such as the positive plate of a "cupron-element"), these two electrodes dipping in a solution of caustic potash contained in a beaker. Ferric oxide collects at the bottom of the beaker. C. F. B.

Action of Halogen Compounds of Phosphorus on Iron, Nickel, and Cobalt. By A. GRANGER (*Compt. rend.*, 1896, 123, 176—178).—The author has investigated the action of the vapour of

phosphorus trichloride, tribromide, and diiodide on iron, nickel, and cobalt reduced from the oxide, or better, from the oxalate. At a red heat, iron and phosphorus trichloride yield the phosphide, Fe_4P_3 , in small, brilliant, iron-grey, prismatic crystals. Nickel, under the same conditions, yields the red, crystalline product described by Pelletier, but by prolonged action of the chloride, at a somewhat higher temperature, small, brilliant, yellowish-white crystals of the subphosphide, Ni_2P , are obtained. At a temperature above a red heat, but not exceeding bright redness, cobalt yields a subphosphide, Co_2P , which forms small, prismatic needles.

Phosphorus bromide does not readily attack the three metals under the conditions stated, and yields unsatisfactory results. The diiodide very readily yields the phosphides, Fe_4P_3 and Ni_2P , but does not readily attack cobalt. The trifluoride yields the same products mixed, however, with the corresponding fluorides and the products of the action of fluorine on glass.

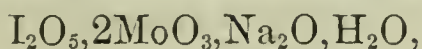
The iron phosphide, Fe_4P_3 , is attacked with difficulty by aqua regia, but the nickel and cobalt subphosphides dissolve readily in it, and also in nitric acids. All three compounds are readily attacked by chlorine and by fused alkalis, and lose phosphorus when heated.

C. H. B.

Preparation of Potassium Dichromate by Electrochemical Means. By RICHARD LORENZ (*Zeits. anorg. Chem.*, 1896, **12**, 396—397).—A solution of potassium dichromate can be prepared by passing a current of 2 volts potential between an anode of ferrochrome (containing about equal quantities of chromium and iron) and a cathode of porous copper oxide, the two electrodes dipping in a solution of caustic potash contained in a beaker. Ferric oxide collects at the bottom of the beaker.

C. F. B.

Combination of Iodic acid with other Acids. By PAUL CHRÉTIEN (*Compt. rend.*, 1896, **123**, 178—180).—When 100 grams of sodium iodate and 70 grams of molybdic anhydride are boiled for some time with 3000—4000 c.c. of water, the salt,



is obtained in small, stellate groups of slender needles, slightly soluble in water, but soluble in nitric acid. The latter solution precipitates phosphoric acid in the form of a phosphomolybdate. Yellow molybdic acid, $\text{MoO}_3, 2\text{H}_2\text{O}$, is very soluble in hot sodium iodate solution, and the liquid deposits short needles, which, when dried at 100° , have the composition $\text{I}_2\text{O}_5, 4\text{MoO}_3, \text{Na}_2\text{O}$. Potassium iodate yields a salt, $\text{I}_2\text{O}_5, 2\text{MoO}_3, \text{K}_2\text{O}, \text{H}_2\text{O}$, which crystallises in brilliant lamellæ, and ammonium iodate yields an analogous compound. The corresponding barium salt crystallises with 2 mols. H_2O in a bulky mass of long, slender needles, and when a nitric acid solution of this salt is mixed with an equivalent quantity of sulphuric acid, a solution of *iodomolybdic acid*, $\text{I}_2\text{O}_5, 2\text{MoO}_3, 2\text{H}_2\text{O}$, is obtained; this crystallises when concentrated in a vacuum, but the acid is very soluble in water.

Freshly prepared tungstic acid is insoluble in solutions of iodates or of iodic acid, but metatungstic acid combines with iodic acid in

several proportions, and yields a series of iodotungstates when added to cold and somewhat dilute solutions of iodates. Potassium iodate yields crystals of the composition $2\text{I}_2\text{O}_5, 4\text{WO}_3, 2\text{K}_2\text{O}, 8\text{H}_2\text{O}$, analogous to the iodomolybdate.

When syrupy phosphoric acid is boiled with excess of iodic acid, brilliant, nacreous, prismatic crystals are obtained, which have the composition $\text{P}_2\text{O}_5, 18\text{I}_2\text{O}_5, 4\text{H}_2\text{O}$, and are rapidly decomposed by moist air, and converted into a white powder. C. H. B.

Action of Ammonia on Alkali Paratungstates. By L. A. HALLOPEAU (*Compt. rend.*, 1896, **123**, 180—182).—When a large excess of ammonia is added to a concentrated solution of potassium paratungstate, a crystalline precipitate is produced; this dissolves in hot water, from which it separates in crystals of the composition $12\text{WO}_3, 5\text{K}(\text{NH}_4)\text{O} + 11\text{H}_2\text{O}$. They are very thin, rhomboidal lamellæ, which act strongly on polarised light, show extinction at 27° from the axis of elongation, and generally resemble the prismatic crystals of the simple potassium or ammonium paratungstate. The double salt results from the combination in equal molecular proportions of the two simple salts, which are triclinic and isomorphous.

Under similar conditions, sodium paratungstate yields rhomboidal crystals of the compound $12\text{WO}_3, 4(\text{NH}_4)_2\text{O}, \text{Na}_2\text{O} + 14\text{H}_2\text{O}$, obtained by Gibbs by the action of ammonium phosphate on sodium paratungstate in presence of alcohol. If, however, ammonia is added drop by drop to a concentrated solution of the paratungstate until the precipitate redissolves with difficulty, the solution, when concentrated, yields crystals of the compound $12\text{WO}_3, 3(\text{NH}_4)_2\text{O}, 2\text{Na}_2\text{O} + 15\text{H}_2\text{O}$, already described by Marignac. It loses 12 mols. H_2O at 100° . The crystals are rhombic prisms, which act strongly on polarised light, and show extinction at 36° from the axis of elongation. The acid tungstate, $16\text{WO}_3, 3(\text{NH}_4)_2\text{O}, 3\text{Na}_2\text{O} + 22\text{H}_2\text{O}$, is also sometimes obtained from the same liquid in prismatic crystals which show extinction at 35° from the axis of elongation.

These results afford further evidence of the differences between the chemical properties of sodium and potassium paratungstates.

C. H. B.

Specific Gravity and Specific Heat of Alloys of Iron and Antimony. By J. B. VINCENT LABORDE (*Compt. rend.*, 1896, **123**, 227—228).—The alloys were prepared by fusing antimony and iron together in a brasqued crucible.

Iron per cent.	Sp. gr. at 0° .	Mean specific heat $0-100^\circ$.	
		Found.	Calculated.
18.48	7.211	0.0639	0.0625
25.69	7.912	0.0688	0.0670
35.42	8.300	0.0753	0.0731
39.20	8.071	0.0779	0.0754
43.12	8.298	0.0797	0.0778
55.02	8.159	0.0869	0.0854
61.20	8.120	0.0903	0.0892
81.20	7.800	0.1028	0.1019

The sp. gr. is always equal to or higher than that of iron, which is the heavier constituent, and hence the formation of the alloy is accompanied by considerable contraction. At first the sp. gr. increases rapidly with the proportion of iron, and afterwards diminishes but with less rapidity. The specific heat is always higher than the value calculated for a mixture, and the more important differences are much greater than the experimental error. An alloy containing 39.2 per cent. of iron, which corresponds somewhat closely with the formula Fe_3Sb_4 , shows the greatest divergence from the calculated specific heat, and its sp. gr. is also anomalous. Weiss has found that the magnetic properties of iron-antimony alloys increase suddenly when the proportion of iron reaches or exceeds that required by the formula Fe_3Sb_4 .

C. H. B.

Zirconates. By FRANK P. VENABLE and THOMAS CLARKE (*J. Amer. Chem. Soc.*, 1896, **18**, 434—444).—The best method for the preparation of the zirconates is to fuse gently dried zirconia with hydroxides, or, by prolonged heating of the oxides. In the case of the alkaline earths, zirconates are produced containing one equivalent of each oxide, such as CaO, ZrO . The lithium compound obtained was LiO, ZrO . In the case of the alkalis, it seemed to be possible to obtain zirconates having a largely preponderating proportion of zirconia.

J. F. T.

Reaction between Carbon Tetrachloride and the Oxides of Niobium and Tantalum. By MARC DELAFONTAINE and CHARLES E. LINEBARGER (*J. Amer. Chem. Soc.*, 1896, **18**, 532—536).—On passing the vapour of carbon tetrachloride over heated niobic pentoxide, contained in a hard glass tube, both the pentachloride and the oxychloride of niobium are formed, but the latter in by far the greater quantity; of the gaseous products of the reaction, phosgene seems to predominate; the yield of pentachloride is not increased by carrying out the experiment in an atmosphere of carbonic anhydride, or of chlorine, this again illustrating the great tendency of niobium to enter into combination as the niobyl group.

In the preparation of a large quantity of niobyl chloride, a small quantity of an orange-coloured sublimate, more volatile than the chloride, was formed; this the authors consider to be tungsten oxytetrachloride, its formation being due to the niobic acid used being slightly contaminated with a tungsten compound.

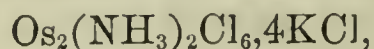
Carbon tetrachloride has no action on tantalic acid, even at a temperature high enough to cause Bohemian glass to soften.

J. F. T.

Action of Reducing Agents on Osmium Nitroso-compounds. By L. BRIZARD (*Compt. rend.*, 1896, **123**, 182—185).—The reduction of potassium osmiumate by formaldehyde in alkaline solution yields a black, gelatinous precipitate, which dissolves in hydrochloric acid, but does not crystallise, even in presence of alkali chlorides. It contains some nitrogen, but not in the form of ammoniacal nitrogen.

If a warmed solution of the osmiumate is mixed with a hydrochloric acid solution of stannous chloride, and the liquid is concen-

trated, after the addition of excess of potassium chloride, *potassium amidochlorosmiate*, $\text{NH}_2 \cdot \text{OsCl}_3, 2\text{KCl}$, is obtained in small, brilliant, maroon-brown crystals, which act strongly on polarised light. The analytical results agree equally well with the formula



but this is not admissible, because the salt is completely converted into the chlorosmiate, $\text{OsCl}_4, 2\text{KCl}$, by strong hydrochloric acid.

The potassium amidochlorosmiate is soluble in water, but insoluble in common organic solvents. The greenish-yellow aqueous solution gradually becomes violet at the ordinary temperature, and deposits an amorphous precipitate of the same colour, but the stability of the solution is increased by the presence of hydrochloric acid or potassium chloride. The salt is only slightly soluble in a concentrated solution of potassium chloride, and this fact can be utilised in its preparation. When heated in air, it gives off hydrogen chloride, ammonium chloride, and osmium peroxide; when heated with aqueous potash, ammonia is evolved, and a violet-black precipitate is formed, which dissolves in hydrochloric acid, but will not crystallise. When evaporated with concentrated hydrochloric acid, the amidochlorosmiate yields a red, crystalline hydrochloride, $\text{NH}_2 \cdot \text{OsCl}_3, 2\text{KCl}, \text{HCl}$, which, by further action of hydrochloric acid, is converted into the chlorosmiate, as already stated.

The amidochlorosmiate reduces permanganate, mercuric chloride, ammoniacal silver nitrate, cupric salts, and Fehling's solution.

C. H. B.

Mineralogical Chemistry.

The "Dilute Coloration" of Minerals. By ERNST WEINSCHENK (*Zeits. anorg. Chem.*, 1896, **12**, 375—392).—By dilute coloration is understood that colour of a mineral which is not natural to the pure substance, nor due to the presence of an isomorphous mineral, but is caused by the presence of a minute quantity of a coloured substance so distributed throughout the mass of the crystal that the resulting coloration exhibits the same relation to the symmetry of the crystal (pleochroism, &c.) as would a colour natural to the mineral itself. Such colorations were once attributed to the presence of "hydrocarbons," because they are destroyed, as a rule, by comparatively slight elevation of temperature. But this view is probably erroneous, for, although crystals of organic substances are readily dyed by organic colouring matters, this is rarely the case with inorganic crystals. Further, the author has demonstrated the presence of traces of titanium in smoky quartz from two different localities, whereas a specimen of colourless rock crystal was found to contain no titanium, even though in some parts of the crystal—not, of course, taken for analysis—crystals of rutile were imbedded. The smoky coloration cannot be due to titanitic oxide, which is colourless, and it is suggested

that it is due to the deep-coloured sesquioxide, which becomes changed to the colourless oxide on ignition, so causing a loss of the coloration. It is further suggested that the analogous oxides of tin and zirconium likewise produce dilute coloration in minerals, and possibly also the oxides of cerium and of vanadium, and of metals related to these. Ferric oxide, too, is probably responsible for many "dilute" yellow and brown shades. In all cases, the colouring agent is to be regarded as of *inorganic* nature. As to the manner in which it is present, it may be regarded as in solid solution in the crystal, or, by those who reject the hypothesis of solid solutions, as existing in the interstices between the molecules of the mineral.

C. F. B.

Nitrogen and Argon in Fire-damp. By TH. SCHLÆSING, jun. (*Compt. rend.*, 1896, **123**, 233—236).—The proportion of nitrogen in fire-damp, collected in such a way as to avoid admixture with air, is very variable; in 20 specimens, the limits were 0.75 and 30.0 per cent. The proportion of argon in this nitrogen was 1.1 per cent., or almost exactly the same as in atmospheric nitrogen. Even in specimens of fire-damp issuing from the coal under high pressure, the percentage of argon in the nitrogen was 1.18. A large number of samples were analysed, and the results will be described subsequently; a considerable proportion of argon was found in every case.

Examination of the gases evolved from powdered coal in a vacuum indicates that argon, if present at all, does not occur in a higher proportion than 0.0005 per cent. by weight.

C. H. B.

See errata p. 1053
Examination of Gases from certain Mineral Waters. By ALEXANDER KELLAS and WILLIAM RAMSAY (*Proc. Roy. Soc.*, 1893, **59**, 68—69).—A sample of inflammable gas from "Allhusen's Well" was found to contain, besides the usual constituents, nitrogen, hydrocarbons, &c., 0.4 per cent. of indifferent gas, the spectrum of which corresponded with that of argon; the helium yellow lines were not visible.

An incombustible gas from another well at the same place was also found to contain 0.5 per cent. of argon. 660 c.c. of gas from a boiling spring near Reykjavik, Iceland, was found to contain 7.45 c.c. of argon, or 1.14 per cent. No helium could, however, be detected.

J. F. T.

An Attempt to determine the Condition in which Helium and the Associated Gases exist in Minerals. By WILLIAM AUGUSTUS TILDEN (*Proc. Roy. Soc.*, 1896, **59**, 218—224).—Experiments were made in order to find out whether the gas evolved from certain minerals by the application of heat was enclosed in cavities or existed in a state of so-called occlusion. Monazite, on being enclosed in a hard glass bulb and exhausted, was found to give off below 130° only carbonic anhydride and water vapour; from 130—140°, however, gas was evolved, which for the first time showed the D₃ line of helium; between this and 446° successive quantities of gas were evolved containing helium.

Cleveite was found to behave in a similar manner.

Experiments were then made for the purpose of ascertaining

whether the mineral from which the gas had been removed was capable of reabsorbing it. For this purpose, massive Swedish cleveite was employed, and it was found that the mineral did not reabsorb the helium mixture at the ordinary atmospheric pressure. In a second experiment, however, conducted under a pressure of $2\frac{1}{2}$ atmos., the mineral was found to have absorbed one-twenty-fifth of its volume of the gas. Further experiments were tried under greater pressure. The apparatus employed consisted of three glass bulbs, A, B, and C, connected by means of a horizontal glass tube, one end of which was attached to a Sprengel pump and the other to a movable reservoir of mercury capable of being raised to a great height. A contained cleveite which had been heated to 400° in a vacuum, B also contained cleveite heated to 170° in a vacuum, and C 7.5 grams of artificial lead uranate which had been heated to redness; the bulbs were heated to 100° and exhausted of air, the gas (prepared from cleveite and freed from carbonic anhydride and water) was then admitted at atmospheric pressure, and the horizontal tube at that end sealed off. The contents of the tubes were then subjected to a pressure of 7 atmos., and heated for 18 hours at 100° , the pressure being maintained for 96 hours. A was then found to have absorbed one-seventh of its volume and B more than one-fourth; the gas evolved from C consisted only of carbonic anhydride.

Cleveite, therefore, appears to reabsorb helium to an extent which is, roughly, proportional to the pressure.

As a result of further experiments, it was found that iron absorbs helium, but to a less extent than it does hydrogen, and palladium much less readily.

The gas evolved from red Peterhead granite was found to contain a large proportion of hydrogen, 15.2 grams of granite yielding 14.9 c.c. of gas, consisting of 24.8 per cent. of carbonic anhydride and 75.2 per cent. of hydrogen; no helium was evolved. Helium was not absorbed by the powdered mineral when treated in the same manner as cleveite.

J. F. T.

Japanese Coal. By FRANK BROWNE (*Chem. News*, 1896, 74, 76—77).—The sample examined was Tubari coal from the island of Yezo. In lumps it is black, in powder chocolate-brown; it burns readily with a bright, smoky flame that soon subsides, leaving a glowing mass; it is non-caking, and contains, per cent., moisture, 3.83; volatile combustible matter, 36.62; fixed carbon, 42.70; ash, 16.85; the ultimate analysis showing C, 62.84; H, 6.37; N, 1.08; O (calculated), 11.01; S (combustible), 1.18; ash (containing 0.49 per cent. of sulphur), 17.52 per cent. Sp. gr. 1.411; heat of combustion calculated = 6,826 cal.

D. A. L.

Magnetic Behaviour of Pyrrhotite. By ANTAL ABT (*Zeit. Kryst. Min.*, 1896, 27, 100—101; from *Értesítő az erd. Múzeum egyl. orr.-term.-tud. szakosztályából*, 1895, 17 (20th year), 20—30, and *Ger.*, 89—100).—The author has investigated the magnetic properties of those ores in which the metals are strongly paramagnetic, namely, ores of iron, nickel, cobalt, and manganese. Two specimens of

hæmatite, and all those of pyrrhotite, possessed magnetic polarity, whilst pyrites and nickel ores did not. Pyrrhotite shows a considerable amount of residual magnetism, exceeding that of magnetite, and its behaviour is similar to that of hard steel. The amount of iron in the ores examined is given by the analyses of G. Nyiredy as: magnetite, 68·20 and 67·50 per cent.; pyrrhotite, 57·58, 57·25, and 55·80 per cent. L. J. S.

Pyrrhotite from Borév. By MÓR PÁLFY (*Zeits. Kryst. Min.*, 1896, 27, 101; from *Értesítő az erd. Múzeum egyl. orv.-term.-tud szakosztályából*, 1895, 17 (20th year), 54—57).—Pyrrhotite occurs with pyrites and quartz at a limestone and phyllite contact near Borév (county of Torda-Aranyosér). The massive mineral is greyish-white with a tinge of red, and is somewhat impure owing to admixed silicate. Analysis gave:

Fe.	S.	Cu.	Insol.	Total.
57·78	35·34	trace	7·20	100·32

After deducting impurities, this is near to $\text{Fe}_{11}\text{S}_{12}$. Mean sp. gr. 4·497. L. J. S.

Some New South Wales and other Minerals. By ARCHIBALD LIVERSIDGE (*Chem. News*, 1896, 74, 113—116).—*Stibnite*, a hard, splintery variety with conchoidal fracture, from Queensland, gave, on analysis:

Sb.	S.	Fe.	SiO_2 .	BaSO_4 .	Total.	Sp. gr.
64·47	26·59	1·00	3·41	2·63	98·10	4·43

Silica and barytes occur as thin veins in the material.

Plumbiferous apatite occurs as crystals in cavities in zinciferous galena at Broken Hill. Probably part of the calcium phosphate is replaced isomorphously by lead phosphate; the crystals, however, enclose specks of galena. Pyromorphite has been found in the same mine.

Barklyite is found at Two Mile Flat, Mudgee, N.S.W., as small pebbles of a dull magenta colour. Hardness about 8·5; sp gr. 3·738. Tough, fracture granular; the powder is pale pink. It is a variety of corundum, which does not appear distinct enough to warrant a special name.

Chrysocolla is described from Broken Hill.

Beryl, from Vegetable Creek, New England, N.S.W., gave:

SiO_2 .	Al_2O_3 .	BeO .	Fe_2O_3 .	CaO .	Total.	Sp. gr.
67·4	18·5	12·9	0·6	trace	99·4	2·80

Cracoite, brilliant, deep orange-red crystals, from Dundas, Tasmania, gave:

PbO .	CrO_3 .	Fe_2O_3 .	Total.	Sp. gr.
66·86	30·99	1·02	98·87	5·92

Fahlerz, massive, from Wiseman's Creek, *via* Brewongle, N.S.W.

Cu.	Pb.	Fe.	Zn.	Sb.	S.	Ni, Co.	Total.
33·004	0·630	2·844	3·693	34·620	25·207	traces	99·998

This corresponds approximately to $\frac{4}{5}\text{CuS}\frac{1}{5}(\text{FeZn})\text{S}, \text{Sb}_2\text{S}_3$. Gold and silver are also present. [Note.—Tetrahedrite is $4\text{Cu}_2\text{S}, \text{Sb}_2\text{S}_3$.]

Ilmenite, from Cloncurry River, Queensland, gave :

TiO ₂ .	SiO ₂ .	FeO.	Fe ₂ O ₃ .	Total.
49·85	1·01	35·70	13·22	99·78

Manganese and magnesium are absent.

Zinciferous galena, occurring in nodules at Broken Hill, contains only a little zinc; blende is absent. The vein-stuff, however, gave :

Pb.	Zn.	S.	Fe.	Cu.	As, Sb.	Insol.	Total.
60·20	15·50	18·94	2·62	0·205	traces	3·16	100·625

This corresponds with $3\text{PbS} + 2\frac{1}{2}\text{ZnS}$, and seems to be related to huascalite and kilmacooite.

Limestone, from Picton, N.S.W., showing cone-in-cone structure, contained 68·20 per cent. CaCO_3 .

Molybdenite, from Eleanora mine, Kingsgate, near Glen Innes, N.S.W.; sp. gr. 4·6.

Mo.	S.	Fe.	Total.
57·31	42·00	1·50	100·81
58·66	41·23	0·39	100·28

Another specimen contained about 6 per cent. of manganese oxide, but probably mechanically enclosed between the folia.

Proustite is described from the United mine, Rivertree.

Scheelite, massive, from Lady Hopetoun mine, Glen Innes, N.S.W. Sp. gr. 5·93; of another portion, 5·3. It contains, besides CaWO_4 , a little water, 2·23 per cent. SiO_2 , 1·52 per cent. Fe_2O_3 , and a trace of manganese.

Cassiterite, from Elsmore mine, Inverell, N.S.W. I, stout pyramids; hardness 6·5; powder, white. II, water-worn fragments; hardness 7; powder, brown.

	SnO ₂ .	SiO ₂ .	Fe ₂ O ₃ .	MnO.	WO ₃ .	Total.	Sp. gr.
I.	94·60	2·00	1·67	0·25	0·06	98·58	6·68
II.	92·52	1·68	3·21	0·98	0·36	98·75	6·54

The loss in these analyses may indicate the presence of rare elements.

Topaz, in short prisms on granite, from the Shoalhaven district, gave the following mean of two analyses :

SiO ₂ .	Al ₂ O ₃ .	F.	H ₂ O(at 100°).	Total.	Sp. gr.
28·19	62·66	14·01	1·21	106·07	3·56
L. J. S.					

Pearceite, and the Crystallisation of Polybasite. By SAMUEL L. PENFIELD (*Amer. J. Sci.*, 1896, [4], 2, 17—29; and *Zeits. Kryst. Min.*, 1896, 27, 65—77).—As corresponding sulpharsenites and

sulphantimonites usually receive different designations, the name pearceite, after Richard Pearce, is proposed for the arsenical varieties of polybasite, $9\text{Ag}_2\text{S}, \text{Sb}_2\text{S}_3$, pearceite being $9\text{Ag}_2\text{S}, \text{As}_2\text{S}_3$. Minerals to which this name can be applied are the arsenical polybasite from Schemnitz analysed by H. Rose, in 1833; that of Aspen, Colorado, described by Penfield; ~~by~~ ^{and} S. H. Pearce (Abstr., 1893, ii, 75); and the mineral described in the present paper. Two other old analyses show arsenic and antimony in about equal molecular proportions.

The mineral here described occurs beautifully crystallised at the Drumlummon mine, Marysville, Lewis and Clarke Co., Montana. Analysis by F. C. Knight gave the following results:

S.	As.	Ag.	Cu.	Fe.	Insol.	Total.
17.71	7.39	55.17	18.11	1.05	0.42	99.85

This gives $\text{S} : \text{As} : (\text{Ag}_2 + \text{Cu}_2 + \text{Fe})$ as very nearly $12 : 2 : 9$, as is required by the above formula, with $\text{Ag}_2 : \text{Cu}_2 : \text{Fe} = 255 : 143 : 19$. The monosymmetric crystals are usually flat, hexagonal tablets, often with highly modified edges. $a : b : c = 1.7309 : 1 : 1.6199$; $\beta = 89^\circ 51'$; $mm = 60^\circ 2'$. On the basal plane are triangular markings, and the crystals show indications of twinning. The colour and streak are black; lustre, metallic; opaque, even in thin splinters. Sp. gr. 6.15. Brittle with no distinct cleavage.

Polybasite, which has been described as being rhombohedral, and more recently as orthorhombic, is here shown to be monosymmetric. A crystal from Himmelfahrt mine, Freiberg, is described, which consists of a rhombohedron with basal plane; this would be difficult to explain if the mineral were orthorhombic. Measurements of perfect crystals from Yankee Boy mine, Ouray, Colorado, gave $a : b : c = 1.7309 : 1 : 1.5796$; $\beta = 90^\circ 0'$; $mm = 60^\circ 2'$.

These parameters of pearceite and polybasite show that there is a tendency for arsenic to increase the length of the vertical axis, and this is also to be noticed in several other cases, for example, in proustite and pyrargyrite. A close similarity is pointed out between these parameters and those of copper glance (Cu_2S), stromeyerite (CuAgS), and many sulpharsenites and sulphantimonites, all of which have a prism angle of nearly 60° ; this would seem to indicate that the sulphide of the metal has had a controlling influence on the crystallisation.

L. J. S.

Rathite, a new Binnenthal Mineral. By HEINRICH BAUMHAUER (*Zeits. Kryst. Min.*, 1896, 26, 593—602).—Rathite is very similar in appearance to the Binnenthal minerals, jordanite, dufrenoyite, and sartorite, which are also compounds of lead, arsenic and sulphur; it is distinguished from these by the presence of parallel systems of very fine striæ, by the twinning, and by the crystal angles. The fine striæ are seen with the aid of a lens, in light at a particular angle, on the crystal faces and on fractured surfaces; it is evidently due to a lamellar structure (which may be isomorphous banding or twinning) of the crystals parallel to the faces of a brachydome. The crystals are orthorhombic, and, like those of the minerals mentioned above,

are elongated and striated in the direction of the macroaxis, and are rich in macrodomes. In the twin crystals, the striated zones of two individuals intersect at an acute angle.

$$a : b : c = 0.668099 : 1 : 1.057891.$$

Multiplying a and c by $\frac{3}{2}$, there is a close relationship between these parameters and those of dufrenoyite. Sp. gr. 5.32. Analysis by A. Bömer gave:

Pb.	S.	As.	Sb.	Fe.	Total.
52.98	23.72	17.24	4.53	0.56	99.03

The antimony is probably too low. A mixture of 5 mols. of dufrenoyite ($2\text{PbS}, \text{As}_2\text{S}_3$), and 1 of jamesonite ($2\text{PbS}, \text{Sb}_2\text{S}_3$), does not correspond so closely to this composition as does a mixture of 5 mols. of $2\text{PbS}, \text{As}_2\text{S}_3 + 2\text{PbS}, \text{As}_2\text{S}_5 = 4(\text{PbAsS}_3)$, and 1 of $2\text{PbS}, \text{Sb}_2\text{S}_3 + 2\text{PbS}, \text{Sb}_2\text{S}_5 = 4(\text{PbSbS}_3)$; the second formula is adopted, and is also expressed structurally. It is supposed that the fine striæ are due to the alternate banding of these two isomorphous compounds, and that the partial replacement of As_2S_3 and Sb_2S_3 by As_2S_5 and Sb_2S_5 accounts for the morphotropic relationship between rathite and dufrenoyite. The mineral is named after the late G. vom Rath.

L. J. S.

[**Calcistrontite, "Feather Ore," &c.**] By E. A. HUGO LASPEYRES and E. KAISER (*Zeits. Kryst. Min.*, 1896, **27**, 41—59).—Calcistrontite was the name used by von der Marck (*Verh. Ver. Rheinlande und Westfalens*, 1882, **39**, 84, Corr.-bl.) for a mineral from Drensteinfurt, near Hamm, Westphalia, which he considered to be an isomorphous mixture having the composition $3\text{CaCO}_3, 2\text{SrCO}_3$. It is here shown to be a mixture of calcite and strontianite; grains of granular strontianite being enclosed in crystalline calcite, the calcite itself forming a granular aggregate. This is well seen in microscopic sections, and, by means of heavy solutions, the two minerals can be separated.

By means of microchemical tests, and the indications of cleavage, it is shown that what has been labelled as "feather ore," from various localities, is really capillary stibnite, and not jamesonite.

A simple apparatus for use in separating minerals by means of heavy solutions is described.

Crystallographic and other notes are given concerning copper glance, blende, quartz, &c.

L. J. S.

Pollucite, Manganocolumbite and Microlite from Rumford, Maine. By H. W. FOOTE (*Amer. J. Sci.*, 1896, [4], **1**, 457—461; and *Zeits. Kryst. Min.*, 1896, **27**, 60—64).—These minerals occur at Black Mountain, Rumford, Maine, in a coarse pegmatite, together with quartz, albite, muscovite, tourmaline, lepidolite, spodumene, amblygonite, beryl, cassiterite, and columbite. The pollucite occurs in irregular masses, and closely resembles white quartz in appearance, but some small particles are colourless and transparent. The material separated for analysis had sp. gr. 3.029—2.938; the caesium

was separated and estimated as Cs_2PbCl_6 ; only a trace of rubidium was detected by the spectroscope. The mean of two analyses is:

SiO_2 .	Al_2O_3 .	Cs_2O .	K_2O .	Na_2O .	Li_2O .	H_2O .	Total.
43.64	16.84	36.14	0.37	2.09	0.08	1.58	100.74

This gives the same formula as that recently deduced by Wells for the mineral from Hebron, namely, $\text{H}_2\text{Cs}_4\text{Al}_4(\text{SiO}_3)_9$.

The dark, reddish-brown manganio-columbite is described crystallographically; $a:b:c = 0.8359:1:0.8817$. Sp. gr. 6.44. The honey-yellow, octahedral crystals of microlite have sp. gr. 5.17.

L. J. S.

Mineralogical Notes [Scapolite, &c.]. By ALFRED J. MOSES (*Zeits. Kryst. Min.*, 1896, **26**, 603; from *School of Mines Quart.*, 1894, **14**, 323).—The ettringite described by the author from Tombstone, Arizona (*Abstr.*, 1893, ii, 536) incrusts, and has evidently been derived from, a silicate which the following analyses show to be an altered scapolite. It is white (Anal. I) or pale green (II), incoherent and corroded, and mixed with ores.

	SiO_2 .	Al_2O_3 .	CaO .	MgO .	Na_2O .	H_2O (at 110°).	H_2O (ignition).
I.	45.86	21.56	12.79	2.43	1.16	4.45	11.74
II.	45.50	21.14	11.96	1.34	—	7.07	12.98

Impurities have been deducted and the analyses calculated to 100. Formula, $(\text{SiO}_4)_{15}\text{Al}_8(\text{Ca}, \text{Mg}, \text{Na})_6\text{H}_{24} + 6\text{H}_2\text{O}$. Sp. gr. 2.66. The gigantic crystals of gypsum from near South Wash, Wayne Co., Utah, are described; also heulandite and stilbite from New Jersey.

L. J. S.

Physiological Chemistry.

Gaseous Exchanges in Inhabitants of the Tropics. By C. EIJKMAN (*Pflüger's Archiv*, 1896, **64**, 57—78).—The oxygen used up was found to be, for Europeans in Europe 250.3, in India 245.7, and for Malaysians, 251.5 c.c. per minute. The respiratory quotient for the same three classes is 0.775, 0.768, and 0.856 respectively. The differences are thus but small, and give little information as to the influence of climate on heat-regulation. The high respiratory quotient in the case of the Malaysians follows from their richly carbohydrate diet.

W. D. H.

Percentage of Argon in Atmospheric and Respired Air. By ALEXANDER KELLAS (*Proc. Roy. Soc.*, 1895, **59**, 66—69).—Experiments were made on the comparative amount of argon in ordinary air, and in air which had been frequently breathed, with the view of ascertaining whether, if the proportion of oxygen and carbonic anhydride in air be very much altered, argon would enter into, or be expelled from the respiratory system.

The amount of argon in 100 c.c. of atmospheric nitrogen was found

to be 1.186 c.c., which owing to the avoidance of the presence of water, is probably more accurate than the numbers 1.04, 1.03, and 1.11 c.c., originally found by Lord Rayleigh and Ramsay.

One hundred c.c. of nitrogen and argon of breathed air (of normal composition) were found to contain 1.210 c.c. of argon.

The percentage is larger than in normal air, but the difference is not great; it would appear, therefore, that argon, like free nitrogen, plays no important part in the animal economy, save as a diluent.

J. F. T.

Action of Pancreatic Juice on Milk. By WILLIAM D. HALLIBURTON and T. GREGOR BRODIE (*J. Physiol.*, 1896, **20**, 97—106).—Doubt having arisen as to whether the results obtained with extracts of the pancreas are applicable to those obtained with the secretion of that organ, the present experiments were performed with the pancreatic juice obtained from dogs by means of a temporary fistula.

The action which the juice has on milk is different from that of rennet, a precipitate of casein occurring in the warm bath (at 35°—40°) in a finely granular form, the milk to the naked eye undergoing no change in its fluidity. On cooling this to the temperature of the air, it sets to a coherent curd which contracts to only a small extent, and is again broken up into fine granules by warming to 35°, the milk apparently becoming fluid again. This may be repeated a great number of times. This phenomenon is not prevented, but only slightly hindered by such an addition of potassium oxalate as completely inhibits the activity of rennet. Experiments performed with extracts of the gland lead to similar results, which may be masked if the action of the tryptic ferment is very energetic. The precipitate produced may be provisionally termed "pancreatic casein." By the action of rennet, it is converted into true casein. Its solubilities are partly like those of caseinogen, partly like those of casein. It is probably something intermediate between the two.

W. D. H.

Metabolism in Poisoning by Carbonic Oxide and Nitrobenzene. By EGMUND MÜNZER and P. PALMA (*Chem. Centr.*, 1896, i, 55—56; from *Zeits. f. Heilk.*, **15**).—In carbonic oxide poisoning there is an increased katabolism in the body. A larger amount of nitrogen than usual leaves the body as ammonia and uric acid, and the excretion of acetone is also increased; this diminishes the next day. The excretion of phosphoric acid is normal for the first two days, and sinks below the normal during the third and fourth day. Glycosuria may occur, and lactic acid be present in the urine, as Araki pointed out.

In a case of poisoning by nitrobenzene, the nitrogen excreted was small, the amount of phosphoric acid was about the normal, and ethereal hydrogen sulphates were increased. On the fourth day glycosuria made its appearance. Poisoning by these substances is compared to that by phosphorus.

W. D. H.

Use of Sugar in Cattle Feeding. By MALPEAUX (*Ann. Agron.*, 1896, **22**, 231—296).—Two heifers and two bullocks of known weight were fed with clover hay (2 kilos.), oat straw (5 kilos.),

maize and cotton cake, in addition to pasture. For 25 days one of each received besides, 500 grams of sugar daily. The results of the experiments were not very decisive, but sugar seemed to assist production of meat, being both a maintenance and a fattening food.

In experiments with cows, sugar did not increase milk production, or appreciably affect the composition of the milk. N. H. J. M.

Nutritive Value of Casein. By GOTTHELF MARCUSE (*Pflüger's Archiv*, 1896, 64, 223—248).—The experiments were conducted in the usual manner of experiments on metabolism and full details are given. The main conclusion is that the nutritive value of casein is the same as that of the proteids of flesh. W. D. H.

Intestinal Absorption. By E. WAYMOUTH REID (*J. Physiol.*, 1896, 20, 298—309).—The general conclusion drawn from the experiments described, is that the effects of excitation and section of the mesenteric nerves on the absorption of peptone and water, can be explained by the concomitant changes in the blood supply to the loops of gut induced by the action of the vaso-motor nerves on the arterioles, and there is no proof of the existence of specific absorptive nerve fibres. W. D. H.

The Basophil Constituent of Sympathetic Nerve-cells. By F. C. EVE (*J. Physiol.*, 1896, 20, 334—353).—The granules in nerve-cells that have an affinity for basic dyes like methylene-blue have been long known, and some observers have described in them changes as the result of activity. In the present research, this basophil constituent was investigated in sympathetic nerve-cells, and the only change to be detected in them as the result of protracted activity is a slight diffuse blue stain in the cell substance, which is attributed to the formation of acid by the cell, and a consequent slight solution and diffusion of the basophil material. W. D. H.

Physiology of the Embryonic Heart. By JOHN W. PICKERING (*J. Physiol.*, 1896, 20, 165—222; compare *Abstr.*, 1893, ii, 424).—The hearts of mammalian embryos, even after being excised from the mother, maintain a fairly constant individual rhythm for three or four days, if they are bathed in a suitable nutrient material. The best nutrient was found to be a mixture of equal parts of the mother's blood, and 0.75 per cent. solution of sodium chloride. If the mother's blood is replaced by that of another species, or by egg-albumin, the beating of the heart becomes irregular, although it may last for several days. The sodium chloride solution alone will maintain activity for one day; the sustaining power of Ringer's solution, the ash of blood, and of gum arabic is about the same as that of sodium chloride. Grimaux's "colloïde aspartique" is nearly as good as blood; the "colloïde amidobenzoïque" kills in from 18 to 24 hours. Water, distilled in glass receivers, is innocuous, although not sustaining; water distilled in metal receivers is toxic (oligo-dynamic action). The general results with drugs are similar to those previously obtained with chick embryos, except that muscarine nitrate and atropine sulphate

exhibit their typical and antagonistic action on both early and late embryos. This, however, is not the case, in the chick's heart prior to the development of a nervous mechanism; chloroform is a depressant, but a small quantity of alcohol mitigates this action. Ether, except in large doses, applied direct to the heart is a stimulant. A large section of the paper is devoted to the action of electrical currents on the heart.

W. D. H.

Estimation of Ethylic Alcohol in the Blood after introduction of the Liquid into the Veins, or the Vapour into the Lungs. By NESTOR GRÉHANT (*Compt. rend.*, 1896, **123**, 192—194).—Alcohol of 25 per cent. was injected into the jugular vein of a dog until the quantity of alcohol was about $1/25$ th of the weight of the blood, which approximates to a toxic dose. The quantity of alcohol present was determined at intervals by means of a modification of the dichromate process. In one case in which the quantity of alcohol injected was 4.9 c.c. in 100 c.c. of blood, there was only 0.72 c.c. after half an hour, 0.54 c.c. after $1\frac{1}{2}$ hours, 0.45 c.c. after $2\frac{1}{2}$ hours, and 0.15 c.c. after $17\frac{1}{2}$ hours. The alcohol passes into the lymph, or is absorbed by the tissues. In another case only 0.2 c.c. of alcohol remained in 100 c.c. of blood after 15 hours, and it had all disappeared after $23\frac{1}{3}$ hours.

When a dog was made to inspire air saturated with alcohol vapour at 22° , 100 c.c. of blood contained 0.1 c.c. of alcohol after two hours' respiration, 0.31 c.c. after four hours, and 0.50 c.c. after six hours. At this point the experiment was stopped; the animal was very ill, but it recovered during the night.

C. H. B.

Blood Coagulation in Albinos. By JOHN W. PICKERING (*J. Physiol.*, 1896, **20**, 310—315).—The condition of the blood varies in animals that are sometimes in an albino and, at other times, pigmented condition. During the albino condition of the Arctic hare, intravenous injection of a nucleo-proteid or of Grimaux's synthesised proteid-like colloids fails to produce intravascular coagulation, whilst during the pigmented condition, coagulation is produced. When the animal is in a transition stage, the effects are inconstant. The "colloïdes amido-benzoïques" of Grimaux are without effect on extravascular blood (dogs and rabbits), but the addition of "colloïde aspartique" to the blood immediately it is shed, hastens its coagulation.

W. D. H.

Initial Rate of Osmosis of Blood Serum. By W. S. LAZARUS-BARLOW (*J. Physiol.*, 1896, **20**, 145—157; compare this vol., ii, 196).—At a temperature of 37° , the blood serum of the ox, horse, and sheep is in osmotic equilibrium with a 1.6 per cent. solution of sodium chloride placed on the other side of the membrane. This is approximately the same as saying that the initial rate of osmosis of the serum is equal to that of a 1.6 per cent. solution of sodium chloride. The greater the amount of proteid which a specimen of serum contains, the more concentrated must be the solution of sodium chloride on the other side of the membrane to produce osmotic equilibrium. Owing to dialysis, a solution of sodium chloride which at first in-

creases in quantity at the expense of the serum, may, later, become absorbed by the serum.

W. D. H.

Sugar-formation in Alcohol Coagulated Liver. By FREDERICK W. PAVY (*Proc. Physiol. Soc.*, 1896, 4—6).—That sugar rapidly appears in the liver after death is an established fact. It is maintained that this is strictly a *post-mortem* phenomenon, and not a true picture of what occurs during life. It is a ferment action, not a vital action, and occurs equally well in a liver which has been coagulated by alcohol immediately after its removal from the body, and then kept in alcohol for months; on being dried and exposed to a suitable temperature in water, sugar is formed in amount approximately equal to that obtained from the fresh liver.

W. D. H.

Behaviour of Polysaccharides with certain Animal Secretions and Organs. By EMIL FISCHER and W. NIEBEL (*Chem. Centr.*, 1896, i, 499—501; from *Sitzungsber. kgl. pr. Akad. Wiss.*, 1896).—Fluids like blood serum, or clear solutions or infusions of various organs were used, toluene or sodium fluoride being added to prevent the activity of living cells; the carbohydrate was added, and the mixture kept in a warm bath for 24 hours. Acetic acid was then added, the mixture boiled, the proteid filtered off, and the filtrate examined for carbohydrates. The results obtained were the following:—Starch, glycogen, and maltose are changed into dextrose by the secretions of different animals. Lactose is not affected by blood-serum; extracts of portions of the small intestine, especially in young animals, however, affect its hydrolysis; it is not affected by any other secretion. Cane-sugar is not affected by blood, or by infusion of stomach; extracts of duodenum of ox and sheep differ from those of other animals by also giving a negative result. Trehalose is feebly hydrolysed by the same extract from some animals, and not at all by that from others. Blood-serum is also ineffective, except that obtained from certain fishes—especially the carp. Raffinose is not altered by the invertin of the intestine, which must, therefore, be a different substance from the invertin of yeast.

Certain glucosides were also investigated. α -Methylglucoside, although so readily decomposed by beer yeast, is unaffected, or only slightly affected, by animal secretions and extracts; β -methylglucoside was decomposed by the secretion of the horse's small intestine. Amygdalin was readily decomposed by the contents of the rabbit's small intestine, but hardly at all by that of the dog. Throughout the experiments great differences are observable—according to the animals used.

W. D. H.

Separation of Colloïds and Crystalloïds. By CHARLES J. MARTIN (*J. Physiol.*, 1896, 20, 364—371).—The filtering apparatus described briefly consists of a Pasteur filter, in the pores of which a membrane of gelatin or silicic acid has been deposited; the filtration being effected under pressure; colloïd substances do not, crystalloïd substances do, pass through the filter. The native proteïds (albumins, globulins, caseinogen, and nucleo-proteïds), glycogen, soluble starch, hæmoglobin, hæmatin, and the lipochrome of serum and egg-

white do not pass the filter. Alkali albumin and acid albumin pass through to a slight degree. Caramel, biliverdin, and dextrins pass through partially. Proteoses, urochrome, and crystalloids pass through. The crystalloids pass through at the same rate as water. The colloïd substances which are in true solution do not pass the membrane on account of the large size of their molecules. That albumin is in true solution is evident from the fact that it exerts osmotic pressure.

The membranes are recommended for use in the study of diffusion, undisturbed by mixing caused by convection currents, but more particularly for the effective separation of crystalloids from colloids, which is much required in the manipulations of chemical physiology.

W. D. H.

Influence of Food containing Nucleïn on the Formation of Uric acid. By F. UMBER (*Chem. Centr.*, 1896, 617; from *Zeit. Klin. Med.*, 29, 174—189).—The administration of a large amount (500 grams *per diem*) of food like thymus, which contains a considerable quantity of nucleïn, increases the excretion of uric acid, as compared with that passed when a similar amount of flesh is given. The same amount of liver in one person caused an effect similar to that caused by thymus, but in others its action was less marked. Kidney and brain gave nearly the same amount of uric acid as flesh, and milk less still. The xanthine bases are increased by administration of alkalis, and of milk.

W. D. H.

Influence of Atropine on the Secretion of Urine. By LUDWIG WALTJ (*Chem. Centr.*, 1896, i, 263; from *Arch. exp. Path. Pharm.*, 36, 411—436).—Atropine lessens the secretion of urine, and hinders the action of diuretics. The injection of large or small quantities of urea into the circulation leads to glycosuria. Simultaneous injection of atropine prevents this.

W. D. H.

Creatinine. By PERCY COOPER COLLS (*J. Physiol.*, 1896, 20, 107—111).—Urinary creatinine, like sugar, is precipitated from aqueous solutions and from urine, when Brücke's lead-acetate method is employed. It is probable that Pavy's high figure for the percentage of sugar in normal urine is due to this circumstance.

Blood contains a small but ponderable amount of creatinine; in sheep's blood the percentage found being 0.000095. Creatinine was separated from the blood as the spherical mercury salt by a slight modification of G. S. Johnson's process.

W. D. H.

A New Solvent for Urinary Pigments. By WILLIAM KRAMM (*Chem. Centr.*, 1896, i, 713—715; from *Deutsch. Med. Woch.*, 22, 25—27, 42—45).—Liquid phenol is a direct solvent of the urinary pigments. Twenty parts of urine are shaken with one of phenol, the urine having first been saturated with a neutral salt, such as sodium chloride or sulphate, or ammonium sulphate; the pigments then pass into the phenol. Tricresol behaves in the same way, but more slowly. The phenol extract is mixed with ether and shaken with water; the water becomes yellow, the phenol and ether reddish. The

yellow pigment is urochrome, the reddish one urobilin. The red pigment of urate deposits is not soluble in phenol. W. D. H.

Phloridzin Diabetes. By NATHAN ZUNTZ (*Chem. Centr.*, 1896, 613; from *Du Bois Reymond's Archiv.*, 1895, 570—574).—An important difference between ordinary diabetes and that produced by phloridzin, is that in the former case the blood is rich in sugar, in the latter it is not. The kidneys must, therefore, in this case act most energetically in withdrawing the sugar from the blood. This increase in the power of the kidney cells was proved by an experiment on a dog in which the urine was collected separately from the two kidneys, into the renal artery of one of which a small amount of phloridzin solution was injected; this one secreted urine containing sugar, the other secreted normal urine. W. D. H.

Alloxuric Substances in the Urine in Nephritis. By G. ÜTZER (*Chem. Centr.*, 1896, i, 616—617; from *Berlin Klin. Woch.*, 3, 72—75).—In health, according to Kolisch, nucleïn derivatives are mainly transformed in the kidneys into the non-toxic uric acid, while a small part passes out as the poisonous alloxuric bases. The normal amount of these bases *per diem* is given as 0.04—0.06 gram, and the relation between their nitrogen and that of uric acid as 1 : 3.82; or the nitrogen of alloxuric bases, to that of total alloxuric substances as 1 : 4.82. His expectation that this relationship would be upset in nephritis is, in the present research, not confirmed. W. D. H.

Febrile Albumosuria. By LUDOLF KREHL and MAX MATTHES (*Chem. Centr.*, 1896, i, 54—55; from *Deutsch. Arch. Klin. Med.*, 54, 511—514; and *Chem. Centr.*, 1896, i, 263; from *Arch. exp. Path. u. Pharm.*, 36, 437—450).—Many proteïd substances raise the body temperature, and appear partly in a hydrated form in the urine. The elevated temperature in many acute specific fevers can be partly accounted for in this way, and proteoses are found in the urine. Enteroproteose is the form most frequently found, and is believed to originate from the bacterial decomposition of nucleo-proteïds. Tuberculous animals respond especially well, by a febrile reaction, to small injections of proteose. Toxic proteïds, like ricin, abrin, and tuberculin produce similar results. W. D. H.

Effect of Drugs on the Tracheal Secretion. By JAMES CALVERT (*J. Physiol.*, 1896, 20, 158—164).—A window in the trachea of an animal (cat under chloroform, urethane, or morphine) being made, and the surface dried by blotting paper, drugs were injected into a vein or subcutaneously, and the rate of formation of secretion observed, and compared with that before the administration of the drug. It was found that alkalis increase the secretion in spite of Ossebach's assertion (*Berlin klin. Woch.*, 1882) to the contrary; that potassium iodide acts similarly, and emetine only markedly so. Apoponin (senegin) in small doses does not increase secretion; in

large doses it diminishes it. Cold and heat applied to the abdomen increase and diminish secretion respectively. W. D. H.

Toxicological Notes on Ortho- and Para-Compounds. THOMAS BOKORNY (*Pflüger's Archiv*, 1896, **64**, 306—312).—Experiments are described which show that in the same organism para-compounds are more poisonous than the corresponding ortho-compounds. W. D. H.

Chemistry of Vegetable Physiology and Agriculture.

Influence of Oxygen on Yeast Fermentation. By R. RAPP (*Ber.*, 1896, **29**, 1983—1985).—The author has repeated the experiments of Chudiakow (Abstr., 1895, ii, 282) on the influence of oxygen and hydrogen on the fermentation produced by yeast, and finds that, contrary to Chudiakow's statement, oxygen does not exercise any retarding effect. The passage of a rapid stream of either gas does produce a diminution of the fermentation, and the author suggests that in the former experiments the oxygen may have been passed more rapidly through the mixture than the hydrogen, and thus have produced a relative diminution of the action of the yeast.

A. H.

Fermentation of Uric acid by Micro-organisms. By ERNEST GÉRARD (*Compt. rend.*, 1896, **123**, 185—187).—The author has previously shown (*Compt. rend.*, **122**, 1019) that uric acid dissolved in sodium phosphate solution is converted into urea and ammonium carbonate by the action of micro-organisms derived from the air, and has suggested that the ammonium carbonate results from the action of some urophagic microbe on the urea, the latter being the true product of the fermentation of the uric acid.

Cultivations in peptonised broth have not led to the isolation of the bacilli or cocci which act on the uric acid, but they have enabled the author to separate these organisms from those which convert urea into ammonium carbonate. When mixed with selected cultivations, the uric acid, dissolved in sodium phosphate solution, is completely converted into urea, but the latter remains unchanged even after several months. Magnier de la Source has shown that when uric acid is boiled with water, it is converted into dialuric acid, and that the latter, when hydrolysed, yields urea and tartronic acid. The author considers that the chemical action of the micro-organisms on uric acid is represented by the equation $C_5H_4N_4O_3 + 4H_2O = 2CON_2H_4 + C_3H_4O_5$.

C. H. B.

Nitrification. By EMIL GODLEWSKI (*Ann. Agron.*, 1896, **22**, 303—304; from *Anzeiger Akad. Wiss., Krakau*, 1895, 178—192).—The results of previous experiments (Abstr., 1893, ii, 544) indicated that nitrifying organisms probably derive their carbon from carbonic an-

anhydride, and not from carbonates. Three experiments are now described, in which the same amounts of solutions of ammonium sulphate (with magnesium carbonate) were inoculated at the same time with pure cultivations of nitrifying organisms. In two experiments the apparatus was filled with air containing carbonic anhydride, in the third with pure air. At the end of the experiments, the air was measured and analysed. With carbonic anhydride, there was a reduction of volume, whilst with air alone there was no reduction. Magnesium carbonate was not available as a source of carbon, but, in presence of carbonic anhydride, nearly the whole of the ammonia was converted into nitrous acid. A portion of the nitrogen of the ammonia is liberated. The amount of free nitrogen produced varies according to the conditions of the experiment. N. H. J. M.

Nitrification. By MARCILLE (*Ann. Agron.*, 1896, **22**, 337—344).—Experiments were made on the relative suitability of ammonium sulphate and phosphate for nitrification. Whilst the phosphate was not found to be more suitable for the production of nitrous acid, it seemed more favourable than the sulphate in transforming nitrous into nitric acid.

As regards the rate of nitrification in different soils, it was found that in a given time a soil from Guadeloupe produced far more nitrates than a soil from Eure-et-Loir. This could not be due to the greater energy of the nitrifying organisms in the Guadeloupe soil, since the addition of a few grams of this soil to the French soil had no effect. It is concluded that the energy with which a soil is nitrified depends not only on the temperature, aëration, and humidity of the soil, and on the energy of the organisms present, but also on the nature of the organic matter to be nitrified. N. H. J. M.

Comparative Studies on the Poisonous Action of various Chemical Substances on Algæ and Infusoria. By THOMAS BOKORSY (*Pflüger's Archiv*, 1896, **64**, 262—306).—A very exhaustive paper; the experiments were performed on types of lower animal and vegetable life, and the strength of the poison noted which produced pathological changes or death. In this way, inorganic acids and bases, numerous salts, various oxidising agents (among which free halogens and potassium permanganate were the most toxic), phosphorus, organic acids, hydrocarbons, alcohols, halogen compounds, aldehydes, nitro-derivatives, sulpho-derivatives, cyanogen compounds, amido-compounds, alkaloids, and poisonous proteïds (abrin and ricin, which are only slightly poisonous to lower organisms) were investigated. W. D. H.

Digestion of Cellulose by Enzymes. By J. GRÜSS (*Chem. Centr.*, 1896, i, 313; from *J. Landw.*, **43**, 379—458).—Previous observers have described the solution of vegetable cell-walls by ferments during germination; this action is ascribed in malt extract to a special ferment (cytase). It is found that the hemicelluloses

undergo hydrolytic decomposition easily, although various members of the group show differences in this respect. W. D. H.

Decomposition of Vegetable Matters. By EMILE BRÉAL (*Ann. Agron.*, 1896, **22**, 362—375).—When water is kept in contact with dead vegetable matter, organisms develop which attack the organic matter, producing ammonia until the liquid becomes too alkaline. When, however, soil, containing nitrifying organisms, is added, the production of ammonia continues, as that already formed is converted into nitrates. If a vegetable infusion is poured on to a lump of soil, the ammonia produced disappears at the surface of the soil, where it is converted into nitrates, but inside the lump of soil there is an accumulation of ammonia, owing to want of aëration; even the nitrates originally present in the interior of the soil are reduced.

Humus becomes soluble in vegetable infusions owing to the ammonia which is liberated, but ceases to be dissolved when soil, containing nitrifying organisms, is added.

Vegetable infusions which have become too alkaline (ammoniacal) to support the life of ammonia-producing organisms, develop moulds which re-absorb the ammonia, producing new nitrogenous substances. This is what takes place on meadows and on peat where nitrifying organisms are absent. N. H. J. M.

Assimilation of the Nutritive Matter of the Soil by Rye. Manurial Requirements of Rye. By REMY (*Ann. Agron.*, 1896, **22**, 344—346; from *J. Landw.*, 1896, **44**, 31—103).—Experiments were made on the effect of various manures (nitrogenous, potash, and phosphatic) on the morphological development of rye. In 1891, nitrogen was taken up in proportion to the production of dry matter during the spring; whilst, in 1893, the nitrogen assimilated was in excess during this period, and the assimilation of nitrogen ceased in this year at the time when, in 1891, it had reached its greatest intensity. This is attributed to the dry season in 1893. Analogous results were obtained in 1881 by Dehérain and Meyer (*Abstr.*, 1883, 493).

As regards the relation between assimilation of potash and phosphates, and production of dry matter, the climatic conditions do not seem to have the same influence as in the case of nitrogen. Climate has more effect on assimilation than manures.

In the case of rye, as with other cereals, nitrogen has more influence than other manures, and a large supply of nitrogen in the soil is necessary during the period of greatest assimilation. This period varies greatly according to the season.

Nitrates should not be applied (for rye) in large quantities in the autumn, when the soil is light; ammoniacal or organic nitrogen is preferable. It is better to apply nitrogen in the spring and in the form of nitrate; and the application should be delayed if the spring is cold and wet. N. H. J. M.

Analytical Chemistry.

Auto-pneumatic Stirrer. By H. BREARLEY (*Chem. News*, 1896, 74, 63).—In place of the mechanical stirrer employed to expedite the action of the solution on the metal when treating steels, &c., with copper ammonium chloride, it is suggested to cause air to bubble through the solution by means of an aspirator. The air should be washed by passing through a solution of lead acetate. D. A. L.

A Modified Form of Measuring Flask. By HEINRICH BILTZ (*Ber.*, 1896, 29, 2082—2083).—The flask has a bulb blown on the neck between the mark and the stopper; the air in this bulb facilitates the thorough mixing of the liquid. In filling the flask it is advisable to use a funnel in order to avoid wetting the sides of the bulb. J. J. S.

Estimation of Hydrochloric acid in Gastric Juice. By WACŁAW VON MORACZEWSKI (*Chem. Centr.*, 1896, 667; from *Deutsch. med. Woch.*, 22, 24—25).—The juice is evaporated down to 1 c.c., placed in a 100 c.c. flask, and a mixture of 25 c.c. of absolute alcohol and 75 c.c. of dry ether added to the mark. The whole is well mixed and allowed to remain; 50 c.c. of the mixture is then filtered into a larger flask, 50 c.c. of water, and a few c.c. of decinormal soda being added in order to neutralise it. It is then titrated with 1/50 normal silver nitrate solution, potassium chromate being used as indicator. After each addition of the silver solution, the flask is well shaken. Calcium and ammonium chloride, which are soluble in alcohol and ether, are present in negligible traces. The method gives the free acid *plus* that united to proteid. W. D. H.

Estimation of Sulphur in Cast-iron or Steel. By G. G. BOUCHER (*Chem. News*, 1896, 74, 76).—Five grams of the iron or steel is dissolved in a strong solution of copper ammonium chloride; when the precipitated copper is dissolved, the solution is filtered, and the residue and paper, after washing free from copper with hot water, are boiled with about 30 c.c. of nitrohydrochloric acid or with bromine water and a few drops of hydrochloric acid. In the latter case, the excess of bromine is boiled off, the solution filtered, barium chloride added, and the barium sulphate collected, washed, ignited, and weighed. In the former case, the solution is filtered, neutralised with ammonia, slightly acidified with hydrochloric acid, treated with 5 grams of barium chloride, and so on. The results obtained with the process are satisfactory. D. A. L.

Estimation of Sulphur in Inorganic Sulphides. VI. By PAUL E. JANNASCH and O. HEIDENREICH (*Zeits. anorg. Chem.*, 1896, 12, 358).—A sample of commercial mosaic gold (SnS_2) was analysed by heating 0.5 gram in a current of oxygen, and weighing the residual

dioxide. The escaping gases were passed through either 3—4 per cent. aqueous hydrogen peroxide, or very dilute hydrochloric acid and bromine, and the sulphuric acid formed was precipitated and weighed as barium sulphate. The chloride was determined by digestion with very dilute nitric acid and precipitation with silver nitrate. Result: Sn 64.69, S 33.07, Cl 0.38, H₂O (lost at 95°) 0.29; total 98.43. The deficit is caused by the presence of oxysulphide in the sample.

C. F. B.

Precipitation of Barium Sulphate by means of Barium Chloride. By GEORG LUNGE (*Zeits. angew. Chem.*, 1896, 453).—A reply to Gladding (this vol., ii, 622). There is no necessity for conducting the precipitation of barium sulphate as recommended by that chemist. Excess of barium chloride added all at once gives a sufficiently pure precipitate.

L. DE K.

Estimation of Sulphuric Anhydride in Fuming Sulphuric acid. Estimation of Sodium Sulphide. By PAUL DOBRINER and WILHELM SCHRANZ (*Zeits. angew. Chem.*, 1896, 453—456).—*Estimation of Sulphuric Anhydride.*—The following process is recommended. The sample is introduced in the well-known manner into a drawn-out weighing tube, which, after the point has been sealed, is re-weighed. The tube is then put into a stoppered flask containing about 150 c.c. of distilled water, and on thoroughly shaking so as to break the tube, the sulphuric acid is dissolved by the water. A weighed quantity of pure sodium carbonate is now added, so as to nearly neutralise the solution, which is then boiled to expel the carbonic anhydride. Phenolphthaleïn is added, and the neutralisation completed by means of accurate normal soda, of which about 3 or 4 c.c. at most should be required. If the total acidity calculated as SO₃ equals *A* per cent., the excess of SO₃ is found by making use of the formula $\frac{49}{9} A - 444.44$. The method of simply titrating with normal soda is scarcely accurate within 1 per cent.; the author's modification yields almost scientifically accurate results.

Assay of Sodium Sulphide.—(a) *Estimation of Sodium Sulphide in the Presence of Sodium Hydrosulphide.*—Twelve grams of the sample is dissolved and made up to a litre. 25 c.c. of this solution is delivered from a burette into 45 c.c. of N/20 iodine, previously mixed with 10 c.c. of normal sulphuric acid and diluted to 150 c.c. The yellow colour should completely disappear; if not, the experiment should be repeated with less iodine solution. After adding starch water, the small excess of liberated hydrogen sulphide is titrated by means of the same iodine solution, and the total amount of hydrogen sulphide is found by an easy calculation. 6 grams of the sample is dissolved in water, decomposed with a known excess of normal sulphuric acid, boiled to expel hydrogen sulphide, and titrated with normal soda using phenolphthaleïn as indicator. This gives the sodium sulphide, which is then calculated to hydrogen sulphide and deducted from the total hydrogen sulphide. The difference is due to hydrogen sulphide existing as 2NaHS. This is now recalculated to

Na_2S , and this being deducted from the sodium sulphide found, gives the real amount of the latter.

(b) *Estimation of Sodium Sulphide in the Presence of Sodium Hydroxide*.—If free alkali is present, the amount of hydrogen sulphide found will be insufficient to account for all the soda calculated as Na_2S . The excess of soda is then calculated to sodium hydroxide.

L. DE K.

Gravimetric Estimation of Selenium. By A. W. PEIRCE (*Zeits. anorg. Chem.*, 1896, 12, 409—412).—A portion of the sample containing from 0.2 to 0.4 gram of selenious anhydride is dissolved in hydrochloric acid, the solution, diluted to 400 c.c., is mixed with potassium iodide (the amount of which must be 3 grams in excess of the theoretical), and boiled for 10—20 minutes, until the red precipitate becomes black, and all free iodine is expelled. The precipitate is collected on an asbestos filter, washed, dried at 100° , and weighed. The results are fairly accurate, but always about 0.1 per cent. too high. It is essential that an excess of potassium iodide be employed, otherwise the precipitate will contain included iodine; also, the solution must be diluted before precipitation, or the precipitate will contain potassium iodide. If the selenium is present in a higher state of oxidation, the estimation is carried out in the same manner, but longer boiling is necessary. The method is very quick and convenient for determining the total percentage of selenium in a sample.

E. C. R.

Experiments on the Citrate solubility of Basic Slags. By H. DUBBERS (*Zeits. angew. Chem.*, 1896, 468—473).—An exhaustive inquiry into Wagner's process. The author comes to the conclusion that the time of shaking with the ammonium citrate solution (half an hour) is quite insufficient, and that a larger quantity of acid ammonium citrate solution should be used. The author recommends using 500 c.c. of liquid, containing 10 grams of free citric acid and 5 grams of the same neutralised by ammonia. The shaking should be continued for about four hours.

L. DE K.

Iodometric Estimation of Carbonic acid. By J. K. PHELPS (*Zeits. anorg. Chem.*, 1896, 12, 431—435).—A weighed quantity of the carbonate is introduced into a flask connected with an absorption apparatus containing a solution of barium hydroxide; the apparatus is connected with an air pump, and the pressure diminished to 250—300 mm. The carbonate is then treated with a solution of phosphoric acid, previously boiled until free from carbonic anhydride, and the liberated carbonic anhydride is expelled into the absorption apparatus by five minutes boiling. The apparatus is cooled, and brought to atmospheric pressure, and the excess of barium hydroxide determined by adding an excess of iodine solution, boiling for a short time to decompose any hypoiodite which may be formed, and then determining the excess of iodine with a solution of arsenious acid. The solution containing the precipitated barium carbonate must be boiled before adding excess of iodine, as otherwise the iodine reacts slightly with the finely divided barium carbonate; after adding excess of iodine, the apparatus is connected with an absorption appa-

ratus containing potassium iodide, to arrest any iodine which may volatilise, and to exclude air. The method is accurate and expeditious; one estimation is easily performed in three-quarters of an hour.

E. C. R.

New Baryta Tube. By H. CHR. GEELMUYDEN (*Zeits. anal. Chem.*, 1896, **35**, 516—517).—When the carbonic anhydride in large volumes of air is to be estimated by Pettenkofer's method, the volume of the baryta solution may change during the absorption. A graduated baryta tube is therefore used, constructed on the pattern of a Gay-Lussac burette, but with the open end bent at a right angle to the main portion of the tube, which is laid in a nearly horizontal position whilst passing in the air through the narrow tube, but when raised into a vertical position allows the volume of the liquid to be read.

M. J. S.

Separation of Silver from Gold by Volatilisation. By JOSEPH W. RICHARDS (*Chem. News*, 1896, **74**, 2—3).—To separate silver from gold in assay buttons (obtained in the blowpipe assay), the button is supported in a hollow on a piece of dense charcoal, which must yield a white ash, and is exposed at an angle of 30° to a pointed needle-like oxidising flame directed downwards at an angle of 45° , precautions necessary to prevent displacement of the button by the blast. The button is heated at a redness, below the boiling point of silver, until it becomes brass-yellow, the temperature is then raised and taken almost to whiteness, when a gold colour is attained, this temperature being maintained until a distinct crimson coating is observed on the white ash; the amount of gold lost is negligible, but if the button is less than 0.25 mm. in diameter, a measured pure gold bead of almost equal size is added before the final stages of heating. The button is cupelled and measured.

D. A. L.

Estimation of Magnesia as Magnesium Pyrophosphate. By HUGO NEUBAUER (*Zeits. angew. Chem.*, 1896, 435—440).—The composition of magnesium ammonium phosphate does not seem to be quite so constant as was formerly believed, as the precipitate often contains excess of phosphoric acid, which may be expelled by a prolonged ignition. In other cases, there may be an excess of magnesia.

To obtain correct results, the sodium phosphate should be added at once, in large excess, to the ammoniacal magnesia solution; it is better still to add it to the acid solution, and then to add the ammonia. Excess of ammonium salts does not hurt, but in presence of much ammonium oxalate the precipitate must, after slight washing, be redissolved in hydrochloric acid, and reprecipitated with ammonia and some more sodium phosphate. The precipitate should be ignited over the blowpipe, or a powerful bunsen burner, for at least half an hour, and, after weighing, it should again be heated, to see if there is any further diminution in weight.

When dealing with small quantities of magnesia only, there is no need for these precautions, but if the amount is large they should not be neglected.

L. DE K.

Volumetric Estimation of Zinc by means of Potassium Ferrocyanide. By LUCIEN L. DE KONINCK and EUGENE PROST (*Zeits. angew. Chem.*, 1896, 460—468; 564—572).—The authors have made an exhaustive investigation as to the various reactions which take place when potassium ferrocyanide is added to a zinc solution. The reaction takes place somewhat slowly; therefore there may, at first, be an excess of ferrocyanide as proved by the uranium reaction. Soon, however, this excess disappears as an insoluble double compound of zinc and potassium ferrocyanide is formed. The direct titration of zinc by means of potassium ferrocyanide is, therefore, not to be recommended. The following process is found by the authors to give trustworthy results: 10 grams of pure zinc is dissolved in hydrochloric acid, nearly neutralised with soda, and made up to 1 litre. 27 grams of potassium ferrocyanide is dissolved in a litre of water. When checking, 20 c.c. of the zinc solution is mixed with 50 c.c. of a 20 per cent. solution of ammonium chloride, 2 drops of a 10 per cent. solution of sodium sulphite, and 10 c.c. of hydrochloric acid (sp. gr., 1.075); the zinc solution must be measured from an accurate pipette, but the others are only roughly measured. 40 c.c. exactly of the ferrocyanide solution is now added, and, after being left for at least 10 minutes, the excess is titrated with the zinc solution until the uranium reaction is no longer obtained. The relation between the zinc and the ferrocyanide is thus determined.

The estimation of zinc in any of its ores is now very simple. 2.5 grams of the sample is dissolved in nitrohydrochloric acid and evaporated to dryness to render any silica insoluble, the residue being taken up with 5 c.c. of hydrochloric acid and a little water. The filtrate is freed from lead, cadmium, &c., by a current of hydrogen sulphide, boiled to expel the gas, and, after cooling, mixed with 25 c.c. of saturated bromine water. After pouring the liquid into a 500 c.c. flask, containing 100 c.c. of strong ammonia and 10 c.c. of a 25 per cent. solution of ammonium hydrogen carbonate, it is, when cold, made up to the mark.

When the precipitate has quite settled, the liquid is passed through a dry filter. 100 c.c. is then pipetted off, acidified with hydrochloric acid, and titrated with the ferrocyanide in the way described.

L. DE K.

Separation of Mercury from Arsenic, Antimony, and Copper by Ignition in a Current of Oxygen. By PAUL E. JANNASCH (*Zeits. anorg. Chem.*, 1896, 12, 359—364; compare this vol., ii, 546).—Mercury can be separated from antimony by oxidising the mixed sulphides with fuming nitric acid, driving off the excess of acid by heating first at 90—100°, then at 150—180°, in a current of air or carbonic anhydride, and finally igniting in a current of oxygen. The antimony remains as the oxide, Sb_2O_3 , and is weighed as such. The mercury that volatilises is collected in vessels containing dilute nitric acid, and is estimated as described previously; the addition of a little hydrogen peroxide promotes the solution of the metal in the acid.

Mercury can be separated from copper by igniting the mixed sul-

phides in a current of oxygen. The mercury volatilises, and is collected in vessels containing dilute nitric acid and bromine water; the solution is evaporated almost to dryness, the residues treated with hydrochloric acid and water, and the mercury precipitated and weighed as sulphide. The copper remains in the vessel as oxide after the ignition, and may be weighed as such, or it may be dissolved in acid and precipitated with sodium hydroxide.

Mercury can be separated from arsenic by evaporating the solution in nitric acid, moistening the residue with water, and adding a little pure magnesia, drying at 180° , and then igniting in a current of oxygen. The mercury volatilises and is collected in vessels containing dilute nitric acid and hydrogen peroxide, and estimated in the solution thus obtained. The residue is dissolved in strong hydrochloric acid, some citric acid is then added, and a large excess of ammonia; the precipitate which forms is converted into magnesium pyroarsenate, and weighed as such.

C. F. B.

Estimation of Nickel in Steel, &c. By H. BREARLEY (*Chem. News*, 1896, **74**, 16--17).—A gram of steel is dissolved in 20 c.c. of nitric acid (sp. gr., 1.2), in a 1100 c.c. beaker, cooled, treated with dilute ammonia to slight precipitation, then with hydrochloric acid until again clear; to this are added 70 c.c. of strong acetic acid, 950 c.c. or so of hot water, and 50 to 70 c.c. of ammonium acetate made by neutralising acetic acid with ammonia. The whole is boiled and made up to a litre, and half this is filtered hot, cooled, rendered alkaline with ammonia, and mixed with 2 c.c. of a solution containing 20 grams of potassium iodide per litre, and 2 c.c. of a solution containing 2.5 grams of silver nitrate per litre; a solution of potassium cyanide (4.5 grams per litre, and standardised against standard nickel) is then run in until the silver iodide dissolves and the solution is clear. Tungsten and manganese do not interfere, and the coloration, due to chromium, is overcome by boiling the iron precipitate for half an hour. Copper has to be separated from the solution containing it and the nickel by means of sulphurous acid and thiocyanate.

With regard to procedure, adding the acetate to the hot solution is advantageous, since, in the presence of 70 to 100 c.c. of acetic acid, the precipitate does not appear before $85-90^{\circ}$, but immediate precipitation should be avoided, as it causes low results. For filtering, fibrous asbestos, on a perforated plate $1\frac{1}{2}$ inch in diameter, is found expedient; the tip of the funnel used must be flat, and until in use the space below the perforated plate must be kept full of water, which is completely displaced by the first 300 c.c. of solution.

D. A. L.

Standardisation of Permanganate. By E. RIEGLER (*Zeit. anal. Chem.*, 1896, **35**, 522).—The chief objection to keeping a standard solution of oxalic acid in readiness for the titration of permanganate is that it does not remain unaltered in strength. This may be overcome by the addition of a sufficient quantity of sulphuric acid. A solution containing 9.9654 grams of oxalic acid and 50 c.c. of concentrated sulphuric acid in the litre underwent no change in strength in the course of a year.

M. J. S.

Examination of Commercial Thorium Nitrate and Separation of Thorium from Cerium. By C. REMIGIUS FRESSENIUS and E. HINTZ (*Zeits. anal. Chem.*, 1896, **35**, 525—544).—The authors having analysed, by methods which they propose to publish later, 11 specimens of mantles for incandescent gas illumination, produced by different makers between March and October, 1895, in which thorium and cerium oxides were the principal constituents, were further required to give an opinion whether the cerium oxide present might be regarded as an impurity resulting from the methods of manufacture in use at that time, or had been intentionally added. The percentage of cerium oxide found in the mantles ranged from 0.38 to 2.02 (average 1 per cent.). Having obtained three samples of thorium nitrate which had been sent into the market during the period in question, one of which had been prepared from monazite, which contains only 4—5 per cent. of thoria, with 50—60 per cent. of oxides of the cerium metals, the percentage of cerium was estimated as follows. The dilute solution (1 per cent. or less) of the nitrate was precipitated by boiling with thiosulphate, and the precipitate dissolved in hydrochloric acid and thrown down by ammonia. The original filtrate was also precipitated by ammonia. The two precipitates were dissolved in hydrochloric acid and both solutions again submitted to the thiosulphate precipitation, this treatment being repeated several times. Finally, the ammonia precipitate from the filtrates was dissolved in nitric acid, and, after driving off the excess of acid, the cerium, yttrium, lanthanum, and neodymium were precipitated by oxalic acid. The ignited precipitate was fused with potassium hydrogen sulphate, again precipitated by ammonia, and dissolved in hydrochloric acid. Cerium was now thrown down alone by the addition of sodium acetate and hypochlorite, this precipitation being repeated a second time. Lastly, the oxide was dissolved in nitric acid, thrown down by ammonia, washed, ignited, and weighed. Yttrium and neodymium (including lanthanum) were separated by saturated potassium sulphate solution. Thorium was in all cases found by difference. The cerium oxide found in the three samples was 0.186, 0.0463, and 0.202 per 100 parts of total oxides, and, since the highest of these is only about one-half of the lowest amount, or one-fifth of the average amount, found in the mantles, the authors conclude that the cerium oxide there present had either been purposely added, or resulted from the use of a thorium salt of less purity than was commercially attainable at that time. As a further proof that the methods known to chemists in 1895 were capable of effecting a far greater degree of separation than was found in the mantles, mixtures of cerium and thorium salts were prepared, containing respectively 2.02 and 0.38 per cent. of cerium oxide. By three precipitations with thiosulphate, and a subsequent precipitation by oxalic acid, there were recovered 98 and 96.6 per cent. of the cerium taken, the precipitates containing only 0.7 and 0.3 per cent. of thoria respectively.

M. J. S.

Separation of Bismuth from the Metals of the Copper and Iron Groups by heating their Salts in a Current of dry Hydrogen Chloride. By PAUL E. JANNASCH and S. GROSSE (*Zeits.*

anorg. Chem., 1896, **12**, 398).—Bismuth, like tin (*Abstr.*, 1895, ii, 462), volatilises under these circumstances at a comparatively low temperature, and so can be separated from metals the chlorides of which are less volatile. C. F. B.

Estimation of Ethylene in Gaseous Mixtures. By P. FRITZSCHE (*Zeits. angew. Chem.*, 1896, 456—459).—The process is based on the fact that ethylene is completely absorbed by strong sulphuric acid, and that this solution, when diluted with twice its bulk of water and submitted to distillation, yields the quantitative amount of alcohol.

When operating on mixtures rich in ethylene, the process scarcely gives any trouble, but when the gas is present in traces only it is not so simple. In this case, a large quantity of the gaseous mixture is introduced in a glass apparatus containing a little sulphuric acid, which is continually allowed to run over the sides, so as to offer a large surface to the gas. To accelerate the absorption, the apparatus is heated in an air bath at 100°. After diluting the acid and distilling, the distillate is neutralised with soda and again submitted to distillation; this has to be repeated until the amount of alcohol reaches about 1—2 per cent. It is then estimated, as usual, by taking the specific gravity of the liquid.

Any butylene may be first separated from the ethylene by the action of sulphuric acid of 70 per cent., which does not affect the ethylene. Experiments conducted with the idea of converting the ethylene into ethylic barium sulphate, and estimating this volumetrically, have not, as yet, yielded satisfactory results. L. DE K.

Estimation of Essential Oil of Mustard in Feeding Cakes. By MAX PASSON (*Zeits. angew. Chem.*, 1896, 422—423).—Twenty-five grams of the sample is introduced into a flask containing 300 c.c. of water and 0.5 gram of tartaric acid. The flask, which is provided with a safety tube, is connected with a smaller flask containing 75 c.c. of glacial acetic acid and a little zinc and iron dust, to effect a partial reduction of the ethereal oil. To prevent any escape of the latter, the second flask is fitted with a bent tube dipping into sulphuric acid contained in a beaker.

The mixture is slowly distilled for about two hours, and then the acetic and sulphuric acids are mixed. An aliquot part of the mixture is boiled with an equal bulk of sulphuric acid and a drop of mercury to convert the nitrogen into ammonia, which is then estimated as usual.

One c.c. of N/10 soda represents 0.0099 gram of essential oil of mustard (allylthiocarbimide). Test experiments with small quantities of the pure oil were quite satisfactory. L. DE K.

Estimation of Sugar in Blood. By E. WAYMOUTH REID (*J. Physiol.*, 1896, **20**, 316—321).—In the method described, phosphotungstic acid is used as the precipitant for proteid; this is filtered off and washed by the use of a filter plate, and the sugar estimated by

the Allihn-Soxhlet gravimetric process. The results obtained show that the method is both accurate and rapid. W. D. H.

Messinger's Method of Estimating Acetone. By H. CHR. GEELMUYDEN (*Zeits. anal. Chem.*, 1896, **35**, 503—516).—The author, desiring to employ Messinger's method (Abstr., 1889, 313; 1891, 370) for the estimation of acetone in the breath of animals and in urine, examined by means of test-analyses the influence of the various modifications which the circumstances necessitated. Collischonn's statement that a mixture of iodine and alkali hydroxide soon loses the power of converting acetone into iodoform is amply confirmed. Such a solution cannot, therefore, be employed for absorbing acetone from the products of respiration. By passing the gases through strong potash alone, all the carbonic anhydride and part of the acetone were absorbed. The gases were then conducted over ignited cupric oxide, and the carbonic anhydride produced was absorbed in a special form of Pettenkofer's tube (see this vol., ii, 674). Blank experiments showed that the air from the lungs of animals contained no other volatile organic substance, and test experiments in which known quantities of acetone were volatilised in the empty live cage yielded results within 10 per cent. of the truth. Since this method required the use of very strong potash solution (40 per cent.), the influence of this high strength on the estimation was examined, and it was found that no loss of acetone occurred when it was kept dissolved in such potash for 24 hours before titration, but that it was necessary to dilute the solution with 2—3 vols. of water before adding iodine, otherwise the formation of iodoform was so instantaneous that some iodine became enclosed. In carrying out the Messinger-Huppert method for estimation in urine, some loss is inevitable; this amounted on an average to 6.75 per cent. when the distillate was cooled with ice, and to 8.3 per cent. when water of a few degrees above zero was used. Acetone solutions of very low temperature do not, however, react completely with iodine, especially when the alkali present is greatly diluted. The temperature should, therefore, be raised to 18—20° by addition of hot water or hot potash just before the iodine. The distillation should be carried nearly to dryness, the end of the condenser tube dipping into the potash in the receiver. A small correction is required for some volatile substance which distils from normal urine and consumes iodine, although it produces no iodoform. In human urine, amounts varying from 0.58 to 1.35 (calculated as milligrams of acetone) per 100 c.c. were found. The addition of urea should be avoided, unless nitrites are present, since it lowers an already deficient yield. M. J. S.

Examination of Oil of Bergamot. By ARTHUR BORNTRÄGER (*Zeits. anal. Chem.*, 1896, **35**, 523—525).—The discrepancy between the percentages of linalyl acetate found by Schimmel and Co., and the author respectively (this vol., ii, 228) seems to have been due to differences in the ripeness of the fruit from which the oil was obtained. Five samples of oil prepared by simple pressure from sound, ripe fruit gave the limits 38.5—42 per cent. Later estima-

tions by Schimmel and Co. in last seasons oil have given an average of 37 per cent., the oil from unripe fruit showing only 33—34 per cent., and a few specimens towards the close of the season exhibiting 40 per cent. and upwards (44 per cent.). The product of the season was, however, of low quality.

M. J. S.

Simple Process for Testing Linseed Oil, Boiled Oil, and Paints. By RUDOLF HEFELMANN and PAUL MANN (*Chem. Centr.*, 1896, i, 133; from *Pharm. Central-Hall.*, 36, 685—688).—The chief adulteration practised is the addition of rosin oil, rosin, or rosin soap; mineral oil is also frequently used. The authors find that these frauds may be readily detected by the butyro-refractometer. Pure oil and boiled oil, which at 25° give a refraction of 80—84.5, show, on mixing with 20 per cent. of rosin or rosin oil, a refraction above 100. Mineral oils also cause a higher refraction. The polariscope may also be used, as rosin oil will cause a strong right-handed, and rosin, a slight right-handed polarisation, whilst mineral oil causes a slight left-handed polarisation. The experiment is carried out by shaking 15 c.c. of the sample with 15 c.c. of absolute alcohol; the alcoholic layer is poured off, mixed with a little chloroform, filtered, and then polarised. When testing paints, 2—5 grams of the sample is treated with 20 c.c. of light petroleum, and, after whirling in a centrifugal apparatus, the liquid is poured off, evaporated, and the oil, after drying at 100°, is tested in the refractometer.

L. DE K.

Iodine Number of Pure and Boiled Linseed Oil. By ALEXANDER KATZ (*Chem. Centr.*, 1895, ii, 463; from *Forsch. Ber. Lebensm. Hygiene*, 2, 203—204).—The iodine number depends on the time during which the Hübl solution is allowed to act, but remains constant after 24 hours. The action should be allowed to take place in the dark. The average iodine number of raw linseed oil is 182; that of boiled oil 173.

L. DE K.

Iodine Number of Cacao Butter. By F. FILSINGER (*Zeit. anal. Chem.*, 1896, 35, 517—521).—The wide limits, 32.8 to 41.7, assigned by Strohl (this vol., ii, 506) induced the author to recall the results obtained in 1889 by himself and Henking in the examination of all the varieties of raw cacao in use in Germany, 18 in number (compare Abstr., 1891, 869). All the results lay between 33.4 and 37.5, and these limits have been fully confirmed by more recent experience. It is suggested that the fat in Strohl's specimens, some of which were several years old, may have become decomposed with liberation of free acids, which, as is well-known, absorb more iodine than the neutral fats. Strohl's samples having been wholly consumed, no re-examination is possible.

M. J. S.

Extracting Fat from Cheese for Testing Purposes. By OTTO HENZOLD (*Chem. Centr.*, 1896, i, 140—141; from *Milch Zeit.*, 24, 729—730).—Three hundred grams of the sample of cheese, cut up into little dice, is shaken in a wide necked flask with 700 c.c. of

5 per cent. aqueous potash heated to 22° . After about 10 minutes, the casein has dissolved, and the fat floats on the surface. It is then removed, washed, melted, filtered through a small filter, and submitted to the usual tests.

L. DE K.

New Method for Quantitative Isolation of Alkaloids. By KARL KIPPENBERGER (*Zeit. anal. Chem.*, 1896, 35, 407—421).—In continuation of his work on the detection of poisonous alkaloids in cadaveric matter (*Abstr.*, 1895, ii, 465; this vol., 282), the author has developed a method of obtaining the pure alkaloids from their periodides. He first shows that by precipitating neutral, or feebly alkaline solutions with the iodine reagent, the precipitate is free from ptomaines or other normal constituents of an extract of cadaveric matter. Having, therefore, obtained an extract which may contain these substances, it is acidified and heated to coagulate albumin, then neutralised or rendered feebly alkaline, and precipitated by an iodine solution containing 12.7 grams of iodine and 60 grams of potassium iodide per litre. The precipitate is collected on an asbestos filter, washed thoroughly with cold water, and dissolved in a small quantity of purified acetone, in which menstruum all the alkaloid periodides are freely soluble. On treating the acetone solution with an alkaline hydroxide, and then acidifying with hydrochloric acid, the alkaloid is converted into its hydrochloride, with liberation of iodine, the latter, after warming to expel acetone, being removed by the addition of thiosulphate. Excess of sodium carbonate is then added, and the alkaloid extracted by shaking with chloroform (in some cases a mixture of chloroform and ether; in others, morphine and narceine, chloroform and alcohol). The chloroform solution leaves the pure alkaloid on evaporation, but as an uncertain amount of water of crystallisation may be present in the residue, the weight requires to be confirmed by some form of titration (see next abstract, also 1895, ii, 467). The behaviour of morphine is peculiar. On gradually adding the iodine solution to a morphine salt supersaturated with alkali, a grass-green colour is obtained before any precipitate is produced. This seems to be due to a partial oxidation of the morphine to oxydimorphine, and is characteristic of that alkaloid.

A similar method can be applied to the preparation of the pure alkaloids from plant extracts. After treating the acetone solution with alkali and acid as above, and before adding thiosulphate, the whole is shaken with petroleum, of boiling point $30-50^{\circ}$, by which certain impurities are removed. This branch of the subject the author proposes to study more minutely.

The tendency, which most alkaloids exhibit, to turn brownish when their ethereal solutions are evaporated and the residue is dried on the water bath, can be completely counteracted by the presence of a little alkali carbonate, and the trace of this salt, which ether is capable of dissolving, suffices for the purpose. Sodium carbonate is, therefore, to be preferred to ammonia for the liberation of an alkaloid from its salts.

A common method for recovering an alkaloid from its ethereal solution is to convert it into a salt by adding an acid, but since the

ethereal solutions obtained from cadaveric matter are very liable to contain ammonia, as well as amido-bases and acids, the salts of these substances separate simultaneously. As, however, none of these give precipitates with iodine, the use of the iodine method is here very advantageous.

M. J. S.

Titration of Alkaloids by Iodine Solution. III. By KARL KIPPENBERGER (*Zeit. anal. Chem.*, 1896, **35**, 422—471).—As indicated in the earlier papers on this subject (*Abstr.*, 1895, ii, 467; this vol., 282) the amount of free iodine consumed, when a solution of iodine in potassium iodide reacts with a salt of an alkaloid to form periodide, is always greater than corresponds with the equation $\text{Alk.HCl} + \text{KI} + \text{I}_2 = \text{Alk.IH.I}_2 + \text{KCl}$, and varies considerably not only with the different alkaloids, but with varying conditions of the experiment. Attempts to produce the alkaloid hydriodides by treating the hydrochlorides (or sulphates) with various metallic iodides (ammonium, magnesium, or barium), either before, or simultaneously with the addition of the iodine reagent, led to no greater uniformity in the results, and the same was the case when the amount of free acid (whether hydrochloric, hydrobromic, or hydriodic) in the alkaloid solution was increased. The addition of haloïd salts had in general the same effect, although with brucine the addition of a considerable amount of potassium iodide, or with morphine, of bromide, reduced the amount of iodine consumed to the theoretical 2 atoms. Finally, however, the following method was found to be applicable to all the alkaloids examined (brucine, morphine, atropine, narcotine, quinine). The alkaloid is dissolved in the smallest possible excess of a standard acid (hydrochloric or sulphuric) avoiding dilution as far as possible. There is then added a solution of silver iodide in potassium iodide prepared by dissolving 1 gram of silver nitrate, and 10 grams of potassium iodide in 20 c.c., and employing only so much of this reagent as is exactly equivalent to (or very slightly in excess of) the acid used. Thus, for 0.1 gram of hydrogen chloride there would be used $20 \times 0.1 \times 170/36.5 = 9.32$ or 9.4 c.c. Should a greater excess of the silver solution have been added, and a double salt of the alkaloid and silver have thereby been precipitated, this injurious effect can be counteracted by adding more potassium iodide, and waiting until the precipitate is redissolved. Iodine solution (N/20) is then added in the smallest possible excess. The formation of the alkaloid periodide is complete in 2—3 minutes. The liquid is poured through an asbestos filter, and the excess of iodine in an aliquot part of the filtrate is estimated by N/20 thiosulphate. Using thiosulphate of this strength, there is no risk of forming silver thiosulphate. One molecule of alkaloid consumes exactly 2 atoms of iodine, except in the case of quinine, where the tendency to the formation of diacid salts is exemplified by the consumption of 4 atoms.

M. J. S.

Testing Cinchona Extract. By MARIUS L. Q. VAN LEDDEN HULSEBO-SCH (*Chem. Centr.*, 1896, i, 141—142; from *Ber. pharm. Ges.*, 1895, 286).—One gram of the sample is dissolved in a small beaker in 5 c.c.

of water and 5 drops of normal hydrochloric acid. After pouring it into the author's extraction apparatus, which is a kind of Soxhlet's tube, the beaker is rinsed twice with 5 c.c. of water, and the liquid is then extracted with ether for an hour. After adding 2 c.c. of normal soda to liberate the alkaloids, the extraction is repeated, and, after evaporating off the ether in a tared flask, the alkaloids are dried at 100° and weighed.

To estimate the amount of cinchona tannates, 10 grams of the liquid extract is introduced into a tared narrow beaker, and mixed with 10 c.c. of a 20 per cent. solution of sodium acetate. The turbid mixture is heated on the water bath until the tannate has agglomerated and coated the sides of the beaker. The liquid is poured off, the deposit washed with a very little water, dried at 100° , and weighed.

L. DE K.

Reactions of Digitalin. By C. C. KELLER (*Chem. Centr.*, 1896, 132; from *Ber. pharm. Ges.*, 1895, 275).—Commercial digitalin contains four active constituents: Digitonin, a glucoside yielding, on hydrolysis, digitogenin, glucose, and digitalose; digitalein, an amorphous glucoside, yielding digitaligenin, glucose, and digitalose; digitalein, a crystallised glucoside, yielding products not yet investigated, and digitoxin, a bitter principle. The author has discovered delicate colour reactions for these four substances. The sample is dissolved in 3–4 c.c. of glacial acetic acid, a drop of dilute ferric chloride is added and then an equal bulk of sulphuric acid, without shaking. The colour generated at the place where the two layers touch is carefully observed. Digitonin gives a faint rose-red, evanescent, colour. Digitalin gives a bright carmine-red colour, very permanent, still visible with 0.05 milligram per c.c. Digitalein gives a similar colour but less distinct and not so permanent. The test with digitoxin is very characteristic. The result is a dirty bluish-green ring, which soon breaks up into two layers, the bottom one of which is brownish-red, whilst the top assumes an indigo-blue colour.

L. DE K.

Chemical Examination of Cheese. By ALBERT STUTZER (*Zeit. anal. Chem.*, 1896, 35, 493–502).—For all the estimations, except that of ash, a mixture should be prepared by triturating the cheese with four times (or in the case of soft cheese, five times) its weight of washed, ignited, and sifted quartz sand. The ash, water, fat, and total nitrogen are estimated by the usual processes of incineration, drying at 100° , extracting the dried residue with ether, and the Kjeldahl process respectively. For the distillation of the ammonia, strontium carbonate is a safer form of alkali than magnesia or magnesium carbonate. Nitrogenous compounds (other than ammonia), which are not precipitable by phosphomolybdic acid from a cold, aqueous extract of the cheese, are set down as amides. For experiments on the digestibility of cheese, a stock of pepsin solution is prepared as follows:—The mucous membranes of six fresh pig's stomachs are cut up small, and extracted for 24 hours with 30 litres

of 0.2 per cent. hydrochloric acid, 15 grams of thymol, dissolved in alcohol, being added as a preservative. The liquid is then strained (without squeezing) through a flannel bag, and filtered, first through loose, then through dense, filter paper. It retains its activity for several months. To estimate the total-digestible constituents, a quantity of the sand mixture containing 5 grams of cheese is freed from fat by ether, and then digested for 48 hours at $37-40^{\circ}$ with 500 c.c. of this extract, adding every two hours 5 c.c. of 10 per cent. hydrochloric acid until a total acidity of 1 per cent. is reached. The indigestible residue is then collected on an asbestos filter, and its nitrogen estimated. For albumose and peptone, the cheese is exhausted by boiling with 100 parts of water (in five portions), and one part of the cooled and filtered extract is acidified with sulphuric acid, and precipitated by phosphomolybdic acid. Another part of the extract is concentrated and saturated with zinc sulphate (see this vol., ii, 83), and the filtrate is tested for pancreas peptone by adding strong soda solution until the zinc oxide is redissolved, and then a few drops of 1 per cent. copper sulphate solution (the biuret reaction). The amount of peptone is calculated from the difference between the nitrogen in the phosphomolybdic and zinc sulphate precipitates. Deducting the soluble and the indigestible nitrogen from the total nitrogen, the remainder gives the casein and albuminates, or these may be directly, but less conveniently, estimated in the residue of the extraction with hot water. It is advisable further to estimate the digestibility of the cheese by submitting it to a process of interrupted digestion. A quantity of the sand mixture (in this case not freed from fat), containing 0.15 gram of nitrogen in the form of insoluble, but digestible casein and albumin, is treated with 150 c.c. of the pepsin solution and 350 c.c. of water containing 0.7 gram of hydrochloric acid, both liquids being warmed to 40° before adding, and the mixture being maintained at the same temperature for 30 or 60 minutes, stirring every five minutes. At the end of the given period, the whole is poured into two large, rapid, ribbed filters, and a portion of the filtrate collected in the first five minutes is used for the nitrogen determination.

M. J. S.

INDEX OF AUTHORS' NAMES.

ABSTRACTS. 1896. Parts I & II.

Marked A. i and A. ii respectively); and also to Transactions, 1896 (marked T.); and to Proceedings of the Session 1895—1896, Nos. 155—168, Nov., 1895—June, 1896 (marked P.).

A.

Abegg, *Richard*, freezing point depressions in very dilute solutions, A., ii, 587.
 Abegg, *Richard*. See also *Walther Nernst*.
 Abel, (Sir), *Frederick Augustus*, Hofmann Memorial Lecture: the history of the Royal College of Chemistry, and reminiscences of Hofmann's professorship, T., 580; P., 1893, 135.
 Abel, *Julius*, α -naphthylpiperidine, A., i, 253.
 Abelous, *J. E.*, and *G. Biarnès*, oxidising power of the blood, A., ii, 119.
 Abram, *John Hill*, acetonuria, A., ii, 264.
 Abt, *Antal*, magnetic behaviour of pyrrhotite, A., ii, 656.
 Ach, *Lorenz*. See *Emil Fischer*.
 Ackermann, *Edwin*, quinine as a developer, A., i, 513.
 — excretion of creatinine during muscular work on a mixed diet, A., ii, 121.
 Adams, *Frank D.*, and *Bernard J. Harrington*, a new alkali hornblende and a titaniferous andradite from Dungannon, Ontario, A., ii, 374.
 Adeney, *Walter Ernest*, nature of fermentative changes in natural and polluted waters and in artificial solutions, as indicated by the composition of the gases in solution, A., ii, 322.
 Aeb, *J. H.*, nitrogen assimilation by plants, A., ii, 381.
 Ahrens, *Cæsar*. See *Maximiliano Dennstedt*.
 VOL. LXX. ii.

Albahary, *Jacques M.*, synthesis of 3'-propylisoquinoline, A., i, 699.
 Albanese, *Manfredi*, behaviour of caffeine and theobromine in the organism A., ii, 319, 492.
 Alberda van Ekenstein, *W.*, crystallised *d*-mannose, A., i, 272.
 Alberda van Ekenstein, *W.* See also *Cornelis Adriaan Lobry de Bruyn*.
 Albert, *Robert*. See *Friedrich Kehrman*.
 Alexéeff, *Wladimir*, pickeringite from the River Mana district, A., ii, 566.
 Allain, *L.*, sulphur as a preservative of chloroform, A., i, 3.
 Allen, *Alfred Henry*, an improved method of determining urea by the hypobromite process, P., 1896, 31; discussion, *ibid.*, 33.
 — preparation of pure hydrofluoric acid, A., ii, 575.
 — composition and analysis of commercial cream of tartar, A., ii, 584.
 — estimation of quinine, A., ii, 584.
 Allen, *Charles R.* See *Harry Clary Jones*.
 Allen, *F. J.*, effect of borax on milk curdling, A., ii, 489.
 Allen, *George Young*. See *Arthur George Perkin*.
 Almenræder, *Karl*. See *Rudolf Nietzki*.
 Aloy, *J.*, thermochemistry of uranium compounds, A., ii, 589.
 Altschul, *Julius*, action of sulphur on unsaturated aliphatic compounds, A., i, 126.
 Altschul, *Michael*, optical method of determining the critical temperature, A., ii, 407.
 Amagat, *Emile Hilaire*, specific heats

- of gases and properties of isothermals, A., ii, 349.
- Ampola, G.**, and **C. Manuelli**, use of bromoform in cryoscopy, A., ii, 238.
- Anderlini, Francesco**, diethylacetylenic dipropionate, A., i, 202.
- atomic refraction of oxygen, A., ii, 229.
- Anderlini, Francesco**. See also **Raffaele Nasini**.
- Andreasch, Rudolf**, dimethylvioluric acid and dimethyldiluric acid, A., i, 88.
- thiohydantoin, A., i, 89.
- Andreocci, Americo**, the four santous acids, A., i, 182.
- constitution of dicyanophenylhydrazine and of Bladin's triazole compounds, A., i, 221.
- Andreocci, Americo**. See also **Stanislao Cannizzaro**.
- Andrews, Ernest Robert**. See **Raphael Meldola**.
- Andrews, Launcelot W.**, analysis of alloys of lead, tin, antimony, and arsenic, A., ii, 501.
- Angeli, Angelo**, action of hydroxylamine on nitrobenzene, A., i, 613.
- Angeli, Angelo**, and **Enrico Rimini**, bromo-derivatives of the camphor series, A., i, 248.
- — action of nitrous acid on safrole, A., i, 295.
- — diazoacetophenone, A., i, 362.
- — isosafrole nitrosite, A., i, 477.
- Antony, Ubaldo**, detection of chromates and arsenates, A., ii, 390.
- Antony, Ubaldo**, and **T. Benelli**, estimation of small quantities of lead in water, A., ii, 549.
- Antony, Ubaldo**, and **G. Giglio**, hydrolytic decomposition of ferric chloride, A., ii, 250.
- — hydrolytic decomposition of ferric nitrate and sulphate, A., ii, 604.
- Antony, Ubaldo**, and **Adolfo Lucchesi**, precipitation of the sulphides of platinum: colloidal platinic sulphide, A., ii, 528.
- Apel, M.**, and **Bernhard Tollens**, pentaglycol: a dihydric alcohol synthesised from formaldehyde and isobutaldehyde, A., i, 115.
- — penta-erythritoldibenzal, A., i, 115.
- — anhydro-enneaheptitol from formaldehyde and acetone, A., i, 115.
- Apel, M.**, and **O. Witt**, condensation of formaldehyde with anhydro-enneaheptitol, A., i, 405.
- Appert, Léon**, alumina in glass, A., ii, 423.
- Appleyard, James Robert**. See **James Walker**.
- Archdeacon, William Henry**. See **Julius Berend Cohen**.
- Arctowski, Henryk**, crystallisation of bromine, A., ii, 17.
- new method of producing artificial oligiste (haematite), A., ii, 307.
- solubility at the solidifying point of the solvent, A., ii, 353.
- volatility of red phosphorus, A., ii, 559.
- solubility of solids in gases, A., ii, 635.
- sublimation velocity of mercury haloid salts, A., ii, 635.
- sublimation tension of iodine, A., ii, 636.
- artificial dendrites, A., ii, 649.
- Armstrong, Henry Edward**, Hofmann Memorial Lecture: notes on Hofmann's scientific work, T., 637.
- studies of the terpenes and allied compounds: note on ketopinic acid — a product of the oxidation of the solid hydriehloride (chlorocamphylene) prepared from pinene, T., 1397; P., 1896, 167.
- the origin of colour. No. 11. The yellow colour of 2:3-hydroxynaphthoic acid, P., 1896, 42.
- note on etherification, P., 1896, 43.
- the relation of pinene to citrene, P., 1896, 44.
- the conditions involved in the occurrence of inversion in the case of asymmetric (optically active) compounds, P., 1896, 45.
- Armstrong, Henry Edward**, and **William Palmer Wynne**, 2:1-8-naphthylaminesulphonic acid and the corresponding chloronaphthalenesulphonic acid, P., 1895, 238.
- — 1:3- α -naphthylaminesulphonic acid and the corresponding chloronaphthalenesulphonic acid, P., 1895, 238.
- — studies on the constitution of the tri-derivatives of naphthalene. No. 15. The disulphonic acids obtained by sulphonating 1:3- α -naphthylamine- and 1:3- α -chloronaphthalenesulphonic acids, P., 1895, 240.
- Arnaud, Albert**, conversion of tannic and stearic acids into stearic acid, A., i, 522.
- Arnstein, Hugo**. See **Franz Feist**.
- Arntz, Emil**. See **Julius Bredt**.
- Army, Henry V.** See **Otto Wallach**.
- Arthus, Maurice**, method of obtaining oxyhaemoglobin crystals, A., i, 400.
- Artmann, K.** See **Julius Troeger**.

- zibascheff, *E.* See *Pavel Iw. Petrenko-Kritschenko*.
 zruni, *Andreas*, artificial cassiterite, A., ii, 307.
 — Forsterite from Monte Somma, A., ii, 309.
 bóth, *Alexander von*, estimation of sulphur in pyrites, A., ii, 71.
 — new process for estimating sulphur in organic compounds, A., ii, 448.
 chan, *Adolf Ossian*, laurolene, a hydrocarbon of the camphor group, A., i, 447.
 — structure and stereochemistry in the camphor group, A., i, 492.
 lanoglou, *P. L.*, combination of atmospheric and chemical nitrogen with metals, A., ii, 417.
 ton, *Emily Alicia*, and *Thomas George Bonney*, an Alpine nickel-bearing serpentine, A., ii, 611.
 tre, *Charles*, potassium derivatives of quinone and quinol, A., i, 18.
 — action of potassium hydroxide and thoxide on quinone, A., i, 153.
 — peroxidised potassium derivatives of quinone, A., i, 154.
 hanasiu and *Paul Langlois*, comparison of the action of cadmium and zinc salts, A., ii, 319.
 nson, *Elizabeth A.*, and *Edgar Francis Smith*, separation of iron from beryllium, A., ii, 220.
 chy, *George*, volumetric estimation of manganese, A., ii, 339.
 — Drown's method of estimating sulphur in pig iron, A., ii, 543.
 — sources of error in Volhard's and similar methods of estimating manganese in steel, A., ii, 627.
 den, *Harold Allden*, and *Gilbert John Fowler*, action of nitric oxide on certain salts, A., ii, 172.
 fschläger, *Heinrich*, action of fused polysulphides on nitrogenous organic substances, A., ii, 574.
 sten. See *Roberts-Austen*.
 enrieth, *Wilhelm*, new derivatives of the isomeric β -chlorocrotonic acids, A., i, 591.
 — isomerism of the crotonic acids, A., i, 617.
 — action of phenylhydrazine on the isomeric ethylic β -chlorocrotonates, A., i, 627.
 — correction [pyrazolone derivatives], A., i, 699.
 uwers, *Karl*, an abnormal tribromoderivative of pseudocumenol, A., i, 149.
 — dibromopseudocumenol bromide and analogous compounds, A., i, 420.
 Auwers, *Karl*, relations between the cryoscopic behaviour of the phenols and their constitution, A., ii, 156.
 Auwers, *Karl*, and *S. Avery*, an abnormal tribromo-derivative of pseudocumenol, A., i, 150.
 Auwers, *Karl*, and *G. (Freiherr) von Campenhausen*, bromo-derivatives of asymmetrical metaxyleneol, A., i, 424.
 — — hydroxytrimethylsuccinic acid, A., i, 525.
 Auwers, *Karl* [and in part *Arthur R. Ewing* and *A. Sondheimer*], indazole derivatives, A., i, 503.
 Auwers, *Karl* [and in part *J. Harger*, *Th. Schiffer*, *F. Schlosser*, *W. Singhof*, *A. W. Titherley*, and *E. Ziegler*], succinic and glutaric acids, A., i, 639.
 Auwers, *Karl*, and *L. Hof*, dibromopseudocumenol bromide, chloride, and iodide, A., i, 421.
 Auwers, *Karl* [and *W. R. Innes*], the cryoscopic behaviour of substituted phenols in naphthalene, A., ii, 293.
 Auwers, *Karl*, and *J. Marwedel*, an abnormal tribromo-derivative of pseudocumenol, A., i, 149.
 Auwers, *Karl*, and *H. A. Senter*, product obtained from dibromopseudo-cumenol bromide by the action of aromatic bases, A., i, 423.
 Avery, *S.* See *Karl Auwers* and *Hudson H. Nicholson*.

B.

- Bablich, *Hermann*, and *Stanislaus von Kostanecki*, hydroxybenzylideneacetophenone [phenyl orthohydroxystyryl ketone], A., i, 239.
 Bablich, *Hermann*. See also *Arthur George Perkin*.
 Bach, *A.*, reduction of nitrates and formation of quaternary nitrogenous compounds in plants, A., i, 635.
 Baczewski, *Max*, the seeds of *Nepheium lappaceum* and the fats contained therein, A., ii, 209.
 Bader, *Richard*, ethereal derivatives of wood gum [xylan] and of xylose, A., i, 335.
 — action of fuming nitric acid on xylose and on arabinose, A., i, 405.
 — deoxyfuroin, A., i, 416.
 Bäckström, *Helge*, artificial ægirine, A., ii, 115.
 Bänziger, *E.* See *Robert Gnehm*.
 Baeyer, *Adolf von*, orientation in the

- terpene series: carone and pinene, A., i, 245.
- Baeyer, Adolf von**, orientation in the terpene series: hydroxy-pinic acid, A., i, 308.
- orientation in the terpene series: norpinic acid, A., i, 620.
- Baeyer, Adolf von**, and **Fritz Blau**, orientation in the terpene series, A., i, 53.
- Baeyer, Adolf von** [and **Eugen Oehler**], orientation in the terpene series: menthone and tetrahydrocarvone, A., i, 247.
- Baeyer, Adolf von** [and **Bertram Prentice**], orientation in the terpene series: pulegone, A., i, 445.
- Baeyer, Adolf von** [and **Victor Villiger**], orientation in the terpene series: pinic acid, A., i, 622.
- Baginsky, Adolf**, and **Paul Sommerfeld**, alloxuric substances in the urine of children in disease, A., ii, 491.
- Bailey, Edgar Henry Summerfield**, and **Edward C. Franklin**, water of the Kaw river and its tributaries, A., ii, 615.
- Bailey, Henry**, analysis of tin slag, A., ii, 451.
- Bailhache**. See **Rivière, G.**
- Baker, H. Brereton**. See **Harold Baily Dixon**.
- Balbiano, Luigi**, constitution of camphoric acid, A., i, 493.
- Balke and Ide**, estimation of phosphoric acid, A., ii, 632.
- Balland**, composition of some French and other oats harvested in 1893, A., ii, 64.
- composition of rice imported into France, A., ii, 212.
- Balland and Maljean**, detection of free sulphuric acid in leather, A., ii, 499.
- Balzer, A.**, sandarac resin, A., i, 493.
- Bamberger, Eugen**, isocoumarincarboxylic acid, A., i, 95.
- action of nitrosobenzene on amido-compounds, A., i, 222.
- chemistry of the diazo-compounds, A., i, 299.
- metallic normal diazo-salts, A., i, 362, 540.
- dissociation of diazosulphonates, A., i, 373, 439.
- composition of the iso-diazo-hydroxides, A., i, 539.
- Bamberger, Eugen**, and **Maja Knecht**, reduction of the nitro- to the hydroxylamine-group, A., i, 430.
- Bamberger, Eugen**, and **Emil Kraus**, thiodiazo-derivatives, A., i, 218.
- — behaviour of certain diazo-compounds towards potassium sulphite, A., i, 610.
- Bamberger, Eugen**, and **Wilhelm Lotter** (with **Bernhard Deicke**), alicyclic derivatives of naphthalene, A., i, 9.
- Barbey, Gaston**, *Cuscuta epithymum*, A., ii, 65.
- Barbier, Philippe**, and **Louis Boiteault**, oil of lignaloes, A., i, 55.
- — oil of lemon-grass, A., i, 31.
- — aldehydes derived from the isomeric alcohols, $C_{10}H_{18}O$, A., i, 34.
- — partial synthesis of geranic acid: constitution of lemonol (geraniol) and lemonaldehyde (geranialdehyde), A., i, 445.
- — extraction of rhodinol from oil of pelargonium and oil of rose, A., i, 445.
- — constitution of rhodinol, A., i, 446.
- — homalinolol: constitution of licarol and licarhodol, A., i, 491.
- — rhodinaldehyde, and its conversion into menthone, A., i, 471.
- — citronellaldehyde and its isomerism with rhodinaldehyde, A., i, 471.
- — synthesis of methylheptenol, A., i, 637.
- Barendrecht, H. P.**, alcoholic hydrate, A., i, 661.
- dimorphism of ice, A., ii, 417.
- Barillot, Ernest**, methylic acetic acid, and carbon from various woods, A., i, 403.
- products of the distillation of wood, A., i, 462.
- Barlow**. See **Lazarus-Barlow**.
- Barnett, Robert E.** See **William Augustus Tilden**.
- Barnstein, F.** See **Oscar Kellner**.
- Barr, John M.** See **George Gerard Henderson**.
- Barral, Étienne**, three orthochlorophenols, A., i, 91.
- Barsilowsky, Jacob N.**, constitution of the products of oxidation of paratoluidine, A., i, 357.
- condensation of aldehydes with aromatic amides, A., i, 358.
- Barthe, Léonce**, mercuric oxycyanide, A., i, 330.
- estimation of boric acid, A., ii, 33.
- Bartoli, Adolfo**, and **Enrico Straciatini**, specific heat of mercury between 0° and 30° , A., ii, 145.
- — specific heats of platinum, silver, tin, lead, and copper, A., ii, 14.
- Barton, G. E.**, arsenic in glycine, A., ii, 499.
- Barvič, Heinrich**, alteration of geranic acid, A., ii, 312.

- rylowitsch, *Alexander*, β -hydroxy- α -dimethylisocaproic acid, A., i, 11.
- sile, *G.*, mannitol fermentation in Sicilian wines, A., ii, 121.
- sile, *G.*, and *E. de Cellis*, estimation of lime in soil, A., ii, 126.
- skerville, *Charles*, relations between copper and concentrated sulphuric acid, A., ii, 474.
- skerville, *Charles*. See also *Frank P. Venable*.
- sset, *Henry*, analysis of anthracene, A., ii, 580.
- telli, *Angelo*, thermal properties of vapours: alcohol vapour, and its relationship to the laws of Boyle and Gay Lussac, A., ii, 150.
- u, *A.*, a new enzyme from yeast, A., i, 453.
- ubigny, *Henri*, composite of kernesite, A., ii, 31.
- uer, *Eugen*. See *Carl Häussermann*.
- uer, *Max*, jadeite from "Tibet," A., ii, 310.
- jadeite, albite, and glaucophane from Tammaw, Upper Burma, A., ii, 311.
- ugé, *Georges*, chromous ammonium carbonate, A., ii, 426.
- um, *Fritz*, influence of methyl groups in the ortho-positions in hindering the formation of oximes, A., i, 222.
- um, *Fritz*, and *Victor Meyer*, introduction of two acetyl groups into aromatic hydrocarbons, A., i, 228.
- umann, *Eugen*, normal occurrence of iodine in the body, A., ii, 263.
- iodine in the thyroid, A., ii, 487.
- umann, *Eugen*, and *Ernst Roos*, iodine compound in the thyroid, A., ii, 487.
- umhauer, *Heinrich*, skleroklase (sarcosite) from Binn, A., ii, 109.
- rathite, a new Binnenthal mineral, A., ii, 659.
- ur, *Alfred*, opoponax from *Bursera*, A., i, 57.
- ur, *A. E.*, determination of some conductivities, A., ii, 144.
- determination of transition points, A., ii, 146.
- ur, *Otto*. See *Rudolf Nietzki*.
- yer, *K. J.*, manufacture of potassium chlorate, A., ii, 517.
- yrac, *Pierre Henri*, preparation of arethyltoluene. Two isomeric barium salts of α -arethyltoluenesulphonic acid. Two α -arethylphenols, A., i, 474.
- preparation of orthoisopropylphenol and of Jacobsen's metapropylphenol, A., i, 605.
- Bayrac, *Pierre Henri*, paracymoquinone, A., i, 606.
- isopropylbenzoquinone: constitution of Jacobsen's metapropylphenol, A., i, 606.
- Bayrac, *Pierre Henri*, and *Ch. Camichel*, absorption of light by solutions of indophenols, A., ii, 345.
- Beal, *W. H.*, estimation of volatile and insoluble acids in butter, A., ii, 129.
- Becke, *Friedrich Johann*, wurtzite from Mies, Bohemia, A., ii, 108.
- Beckmann, *Ernst Otto*, the camphor series. III. Menthones, A., i, 311.
- examination of honey, A., ii, 582.
- Beckmann, *Ernst Otto*, and *H. Eickelberg*, menthones: conversion into thymol, A., i, 313.
- Beckmann, *Ernst Otto*, *Gotthold Fuchs*, and *Victor Gernhardt*, determination of molecular weights. III, A., ii, 236.
- Beckmann, *Ernst Otto*, and *H. Mehrländer*, menthones, A., i, 312.
- Beckmann, *Ernst Otto*, and *G. Schliebs*, organo-metallic compounds, A., i, 124.
- Beckmann, *Ernst Otto* [and *Aug. Stock*], camphorpinacene, A., i, 652.
- Beckurts, *Heinrich*, Angostura alkaloids, A., i, 66.
- Beckurts, *Heinrich*, and *H. Heiler*, examination of fats by means of the refractometer, A., ii, 81.
- Beckurts, *Heinrich*, and *F. Oelze*, deer fat, A., ii, 81.
- Becquerel, *Henri*, phosphorescent radiations, A., ii, 406.
- Bedson, *Peter Phillips*, Lothar Meyer Memorial Lecture, T., 1403; P., 1896, 119.
- Beebe, *Alfred C.*, volumetric method of lead analysis, A., ii, 275.
- Beeson, *J. L.*, apparatus for estimating the water-holding power of soils, A., ii, 496.
- Béhal, *Auguste*, oxidation of inactive camphoric acid, A., i, 55.
- acids formed by the oxidation of inactive campholenic acid, A., i, 179.
- Béhal, *Auguste*, and *Victor Blaise*, action of nitric peroxide on campholenic acid, A., i, 55.
- Béhal, *Auguste*. See also *Guerbet*.
- Behrend, *Otto*, relation between derivatives of ricinoleic acid and oleic acid, A., i, 410.
- Behrens, *Johannes*, physiological studies on hops, A., ii, 207.
- Behrens, *Theodor Heinrich*, microscopic discrimination of cinchonidine and homocinchonidine, A., i, 513.

- Békétoff, Nicolai N.**, molecular conductivity of dilute solutions, A., ii, 348.
- Belar, Albin**, examination of red wines for foreign colouring matters, A., ii, 630.
- Bemmelin, Jacobus Martinus van**, the partition coefficients of solutions in liquid and solid substances, A., ii, 155.
- Benda, Louis**. See **Robert Gnehm**.
- Benecke, Wilhelm**, mineral nutrition of plants, A., ii, 572.
- Benedecenti, A.**, action of ethylic cyanoacetate on *alc*-tetrahydro- β -naphthylamine, A., i, 488.
- Benelli, T.** See **Ubaldo Antony**.
- Benneville, James S. de**, some alloys of iron with molybdenum, tungsten, and chromium, A., ii, 174.
- two definite carbides of iron with chromium (molybdenum and tungsten), A., ii, 175.
- analyses of beryl, A., ii, 186.
- Bentley, William Henry, Edward Haworth, and William Henry Perkin, jun.**, on γ -phenoxy-derivatives of malonic acid and acetic acid, and various compounds used in the synthesis of these acids, T., 161; P., 1896, 35.
- Bentley, William Henry, and William Henry Perkin, jun.**, note on γ -aceto-butyric acid, T., 1510.
- — on the xylic and xylidinic acids, P., 1896, 79.
- Bentley, William Henry, William Henry Perkin, jun., and Jocelyn Field Thorpe**, *cis*- and *trans*-methylisopropylsuccinic acid, T., 270; P., 1896, 64.
- Berg, Armand**, chloro-derivatives of amines, A., i, 8.
- Bergami, F.**, citrate method of determining phosphoric acid, A., ii, 273.
- Bergroth, A.** See **Gustav Komppa**.
- Berlemont, G.**, a new fractionating column, A., ii, 415.
- Berlese, and Livio Sostegni**, effect of copper salts on the growth of the vine and on soil, A., ii, 267.
- Bernhard, J.** See **Rodolphe Engel**.
- Bersch, Wilhelm**, composition of mel-lars, A., ii, 383.
- composition of melons, A., ii, 384.
- Bertè, E.** See **Giorgio Errera**.
- Berthelot, Marcellin Pierre Eugène**, inertness of oxidising and reducing agents in analyses in the wet way, A., ii, 70.
- poisonous effects of acetylene, A., ii, 200.
- Bertram, Julius, and Eduard Gilde-meister**, geraniol and rhodinol, A., i, 381.
- Bertrand, Gabriel**, chemical constitution and oxidisability in presence of laccase, A., i, 534.
- laccase in vegetables, A., ii, 61.
- biochemical preparation of sorbose, A., ii, 494.
- a new oxydase or soluble oxidising ferment of vegetable origin, A., ii, 571.
- Bertrand, Gabriel, and Alfred Mallevre**, pectase, A., ii, 267.
- Bertrand, Gabriel**. See also **Emile Elié Bourquelot**.
- Besana, Carlo**, the polarising microscope and Zeiss' refractometer applied to butter analysis, A., ii, 129.
- Besson, Jules Adolphe**, thionyl bromide and chlorobromide, A., ii, 358.
- action of carbonic chloride on some hydrogen compounds, A., ii, 358.
- action of some hydrogen compounds on sulphuric chloride, A., ii, 417.
- action of hydrogen bromide and hydrogen iodide on phosphorus oxychloride, A., ii, 472.
- action of hydrogen bromide on thiophosphoryl chloride, A., ii, 520.
- action of hydrogen iodide and of phosphonium iodide on thiophosphoryl chloride, A., ii, 560.
- Besthorn, Emil**, reduction of quinolinic acid, A., i, 252.
- Bettel, William**, technical analysis of cyanide working solutions, A., ii, 224, 276.
- Bevan, Edward John**. See **Charles Frederick Cross**.
- Biarnés, G.** See **J. E. Abelous**.
- Biétreix, Alexandre**, dichlorogallic acid and trichloropyrogallol, A., i, 651.
- Biginelli, Pietro**, fraxetin, A., i, 369.
- Billwiller, Johann**, nitrogen assimilation of some papilionaceæ, A., ii, 440.
- Biltz, Heinrich**, oxidation by means of hydroxylamine hydrochloride, A., i, 690.
- determination of the molecular weights of some inorganic compounds, A., ii, 152, 412.
- a modified form of measuring flask, ii, 671.
- Biondi, Cesare**, fermentative processes in the organs, A., ii, 616.
- Birk, Rud.** See **Max Busch**.
- Bischoff, Carl Adam**, formation of carbon chains: alkylation of ethylic malonate and acetoacetate, A., i, 84.
- formation of carbon chains. II Conjugated ethereal malonates, A., i, 129.
- formation of carbon chains. III

Reaction of ethylic chloracetate with ethylic sodiomalonate and sodacetoacetate, i, 466.

ischoff, Carl Adam, formation of carbon chains. IV, V, VI. Reaction of ethylic sodioalkylmalonates and sodioalkylacetoacetates with the ethylic salts of α -bromo-fatty acids, i, 467.

— formation of carbon chains. VII. Conjugated ethereal malonates with single linking, A., i, 468.

— formation of carbon chains. VIII. Conjugated dimethylic malonates with double linking, i, 468.

— formation of carbon chains. IX. Conjugated diethylic malonates with double linking, A., i, 469.

— formation of carbon chains. X. Condensations which should yield an ethereal salt of methylacetylenetetracarboxylic [1 : 1 : 2 : 2-propanetetracarboxylic] acid, A., i, 527.

— formation of carbon chains. XI. Condensations which should yield an ethereal salt of ethylacetylenetetracarboxylic [1 : 1 : 2 : 2-butanetetracarboxylic] acid, A., i, 527.

— formation of carbon chains. XII. Quantitative study of the synthesis of ethereal salts of penta- hexa- and hepta-basic fatty acids, A., i, 600.

ishop, W., estimation of the oxidisability of oils, A., ii, 398.

istrzycki, Augustin and **K. Nencki**, constitution of the alkali salts of phenolphthalein, A., i, 238.

ittó, Béla von, chemical composition of capsicum, A., ii, 209.

lacher, Karl, syntheses with soda-mide derivatives, A., i, 33.

lair, Andrew A., estimation of carbon in steel, A., ii, 544.

lair, Andrew A., and **James Edward Whitfield**, ammonium phosphomolybdate and the reducing action of zinc in the reductor, A., ii, 503.

laise, Victor. See **Auguste Béhal**.

lanshard, Charles T., specific volume and the genesis of the elements, A., ii, 152.

— boiling point and the genesis of the elements, A., ii, 233.

lau, Fritz. See **Adolf von Baeyer**.

leier, Otto, new forms of gas burettes, A., ii, 70.

— apparatus for gas analysis, A., ii, 70, 271, 573.

links, W. N. See **William Albert Noyes**.

liss, C. L. See **William Ridgeley Orndorff**.

Blomstrand, Christian Wilhelm, constitution of aromatic diazo-compounds, A., i, 361.

Blount, Bertram, estimation of oxygen in commercial copper, A., ii, 333.

Blount, Bertram. See also **Harry W. Stanger**.

Bloxam, William Popplewell, qualitative analysis of a mixture of hydrogen sulphide, polysulphide, thiosulphate, sulphite, and sulphate, A., ii, 72.

Blum, F., new series of proteids, A., i, 658.

Blumenfeld, Siegfried, derivatives of cinchomeric acid, A., i, 60.

Blumenthal, Arthur, action of related chemical substances on striped muscle, A., ii, 377.

Blumrich, Jos., [lanite in the] phonolites of North Bohemia, A., ii, 314.

Bömer, A., precipitation of albumoses by zinc sulphate, A., ii, 83.

Bömer, A. See also **Franz Josef König**.

Börnstein, Ernst, action of benzenesulphonic chloride on nitrosodimethylaniline, A., i, 541.

Boettinger, Carl, glyoxylic acid and its behaviour towards carbohydrates, A., i, 5.

— condensation of glyoxylic acid with amido-acids, A., i, 47.

— sulphoparabromobenzoic dichloride, A., i, 371.

— derivatives of ethylic acetoacetate, A., i, 410.

— derivatives of glyoxylic acid, A., i, 411.

— sodium glyoxylate, A., i, 411.

— derivatives of sulphometabromobenzoic acid, A., i, 438.

— derivatives of α -naphthylamine, A., i, 443.

— derivatives of the naphthylamines, A., i, 486.

Bohn, C., flames and illuminating gases, A., ii, 140.

Bois. See **Dubois**.

Boisbaudran, Paul Emile Lecoq de, probable new element in terbia, A., ii, 249.

Bokorny, Thomas, toxicological notes on ortho- and para-compounds, A., ii, 668.

— comparative study of the poisonous action of various chemical substances on algæ and infusoria, A., ii, 669.

Boltwood, B. B. See **Horace Lemuel Wells**; **Henry Lord Wheeler**.

Bonavia, L. See **Antonio Longi**.

Bondzyński, Stanislas, the cholesterol of human fæces, A., ii, 319.

- Bone, William Arthur and David Smiles Jerdan**, the union of carbon and hydrogen, P., 1896, 60.
- Bone, William Arthur, and William Henry Perkin, jun.**, the symmetrical dimethylsuccinic acids, T., 253; P., 1896, 63.
- note on the $\alpha\alpha_1$ -dimethylglutaric acids, T., 268; P., 1896, 63.
- Bonney, Thomas George.** See *Emily Alicia Aston*; *Hugh H. F. Hyndman*.
- Bookman, Samuel**, β -ethoxybutylamine and γ -ethoxybutylamine, A., i, 199.
- Borchers, Wilhelm**, isolation of lithium and of beryllium, A., ii, 520.
- Born, Georg**, pseudonitroles and dialkylidinitromethanes, A., i, 198.
- Bornträger, Arthur**, examination of oil of bergamot, A., ii, 228, 679.
- influence of the two lead acetates on the estimation of invert sugar by the Fehling-Soxhlet method, A., ii, 278.
- Bornträger Hugo**, solution of ignited ferric oxide and other metallic oxides, A., ii, 562.
- Boseley, L. Kidgell.** See *Henry Droop Richmond*.
- Bossel, Fr.** See *Carl Graebe*.
- Bouchard, Ch.**, argon and helium in mineral waters, A., ii, 117.
- origin of the argon and helium in the gas from sulphuretted waters, A., ii, 298.
- Bouchardat, Gustave, and Tardy**, Russian oil of aniseed, A., i, 379, 448.
- Boucher, G. G.**, estimation of sulphur in cast iron or steel, A., ii, 671.
- Boudouard, O.** See *Paul Schützenberger*.
- Bouffard, A.**, heat developed by alcoholic fermentation, A., ii, 12.
- Bougault, J.**, action of sulphur chloride on penterythritol, A., i, 662.
- Bourgeois, Edouard**, action of the monobromo-derivatives of the aromatic hydrocarbons on the lead salts of the thiophenols, A., i, 17.
- Bourgeois, Léon**, artificial crystallised carbonates, A., ii, 110.
- Bourquelot, Émile Elié**, maltase and the alcoholic fermentation of maltose, A., i, 110.
- volemitol, a new saccharine matter, A., i, 273.
- fermentation of maltose by the mould, *Eurotiosis Gayoni*, A., ii, 321.
- presence of a glucoside of methylic salicylate in *Monotropa hypopithys* and a ferment which hydrolyses it, A., ii, 540.
- Bourquelot, Émile Elié, and Gabriel Bertrand**, laccase in fungi, A., ii, 268.
- coloration of the tissues and juice of certain fungi when exposed to air, A., ii, 383.
- Bourquelot, Émile Elié, and Eugène Gley**, action of blood serum on glycogen and maltose, A., ii, 119.
- digestion of trehalose, A., ii, 315.
- Bourquelot, Émile Elié, and H. Hérissé**, emulsion from fungi, A., i, 195.
- alcoholic fermentation produced by substances secreted by *Aspergillus niger*, A., ii, 321.
- Bouveault, Louis**, action of ethyloxalic chloride [ethylic chloroglyoxylate] on hydrocarbons of the benzene series in presence of aluminium chloride, A., i, 551, 616.
- preparation of aldehydes of the benzene series, A., i, 649.
- action of hydrazine on the glyoxylic acids of the benzene series, A., i, 650.
- Bouveault, Louis.** See also *Philippe Barbier*.
- Bradley, Ernest.** See *J. H. Kastle*.
- Braithwaite, Isaac**, reduction of iron oxides by carbonic oxide, A., ii, 173.
- Brand, Fr.** See *Max Busch*.
- Brand, J.**, detection of fluorine in beer, A., ii, 447.
- Brandenburg, Kurt**, poisoning with potassium chlorate, A., ii, 491.
- Brandes, P., and Carl Stoehr**, synthesis of trimethylpyrazine and of tetramethylpyrazine, A., i, 576.
- Braun, Ludwig**, action of isobutaldehyde on malonic and cyanacetic acids, A., i, 594.
- Brauner, Bohuslav**, action of hydrogen sulphide on solutions of cupric salts, A., ii, 648.
- Brauns, Reinhard**, artificial anhydrite, A., ii, 111.
- Bréal, Émile**, reduction of nitrates in arable soil, A., ii, 444.
- decomposition of vegetable matters, A., ii, 670.
- Brearley, H.**, auto-pneumatic stirrer, A., ii, 671.
- estimation of nickel in steel, A., ii, 676.
- Bredig, Georg**, thermal conductivity and ion velocity, A., ii, 348.
- Bredt, Julius**, Tiemann's formulæ for camphor and campholenic acid, A., i, 178.

- Bredt, Julius** [and in part *Emil Arntz* and *Alfred Helle*], camphoronic acid, A., i, 653.
- Bredt, Julius**, and *M. von Rosenberg*, partial synthesis of camphor: constitution of camphoric acid and camphorone, A., i, 178.
- Brenke, William C.** See *Arthur William Palmer*.
- Brenzinger, Karl**, estimation of para-sulphanilic acid, A., ii, 396.
- Briehm, H.** See *Friedrich Strohmer*.
- Brizard, L.**, action of reducing agents on the nitroso-compounds of ruthenium, A., ii, 478.
- double salts of ruthenium and silver, A., ii, 566.
- action of reducing agents on osmium nitroso-compounds, A., ii, 653.
- Brochet, André**, action of chlorine on normal propylic alcohol, A., i, 114.
- action of halogens on formaldehyde, A., i, 276.
- production of gaseous formaldehyde, A., i, 345.
- Brochet, André**, and *R. Cambier*, preparation of methylamine, A., i, 7.
- Brociner, L.**, poisonous effects of acetylene, A., ii, 264.
- Brodie, T. Gregor.** See *William Dobinson Halliburton*.
- Bromberg, Otto**, phthalazine derivatives, A., i, 579.
- Bromberg, Otto.** See also *Emil Fischer*.
- Brooks, Cecil J.**, estimation of tin, A., ii, 579.
- Brown, Adrian John**, *Bacillus subtilis*, A., ii, 321.
- Brown, Amos P.**, chemical behaviour of pyrites and marcasite, A., ii, 108.
- Brown, C. Barrington**, and *John Wesley Judd*, rubies of Burma, A., ii, 32.
- Brown, Horace T.**, and *George Harris Morris*, bacterial infection by air-sown organisms, A., ii, 321.
- Browne, Frank**, Japanese coal, A., ii, 656.
- rügelmann, Gottfried**, preparation of lime and strontia crystals, A., ii, 167.
- rüggemann, Fr.**, derivatives of veratrole, A., i, 356.
- Brühl, Julius Wilhelm**, the benzene problem, A., i, 147.
- etherification and hydrolysis, A., i, 178.
- spectrochemical investigation of the ethereal salts of α - and β -mesityl-oxidoxalic acid, A., i, 522.
- spectrochemical investigation of α - and β -ethylic formylphenylacetates, A., i, 554.
- Brühl, Julius Wilhelm**, hydrogen peroxide, A., ii, 162.
- constitution of water, and the cause of its dissociating power, A., ii, 163.
- Brunck, Otto**, formation of ozone, A., ii, 93.
- Brunlechner, August**, zinciferous melanterite, seelandite, and "zinkmanganerz," A., ii, 256.
- Brunner, F.** See *Max Busch*.
- Brunner, Karl**, new base from isobutylidenephénylhydrazine, A., i, 169.
- an indolium base and its indolinone, A., i, 625.
- Brunnschweiler, E.** See *Karl Elbs*.
- Bruylants, Gustave**, morphine reactions, A., ii, 132.
- Bruyn, Cornelis Adriaan Lobry de**, boiling point of nitroglycerol, A., i, 115.
- action of dilute alkalis on the carbohydrates, A., i, 116.
- Bruyn, Cornelis Adriaan Lobry de**, and *W. Alberda van Ekenstein*, action of alkalis on the sugars: reciprocal transformation of glucose, fructose, and mannose, A., i, 113.
- — transformation of sugars by means of lead hydroxide, A., i, 588.
- — new hydrazones of sugars, A., i, 588.
- Bruyn, Cornelis Adriaan Lobry de**, and *Frederik Hendrik van Leent*, ammoniacal derivatives of milk-sugar, maltose, galactose, xylose, arabinose, and rhamnose, A., i, 118.
- — symmetrical trinitrobenzene, A., i, 147.
- — ammoniacal derivatives of mannose, sorbose, and galactose, A., i, 586.
- — direct substitution of chlorine or bromine for nitro-groups by the aid of hydrochloric or hydrobromic acids, A., i, 604.
- Bryant, A. P.**, separation of the insoluble phosphoric acid derived from bone phosphate from that derived from mineral phosphate, A., ii, 623.
- Bucca, Lorenzo**, artificial formation of magnetic pyrites (pyrrhotite), A., ii, 306.
- Bucher, John E.** See *Arthur Michael*.
- Bucherer, Alfred H.**, electromotive force and partition equilibrium, A., ii, 586.
- Buchner, Eduard**, pseudophenylacetic acid, A., i, 230.
- Buchner, Georg**, analysis of urine: estimation of small quantities of sugar

- by means of Nylander's bismuth solution, A., ii, 225.
- Buchner, Georg**, rapid estimation of wax-substitute in bees-wax, A., ii, 456.
- Bülow, Karl**, dextrins obtained by the hydrolysis of starch, A., i, 273.
- Bürgin, Hans**. See *Friedrich Kehrman*.
- Bugarszky, Stefan**, quantitative separation of bromine and chlorine, A., ii, 216.
- Bull, Benjamin S.** See *Alfred Einhorn*.
- Bullock, J. H.** See *J. H. Kastle*.
- Bunge, Kuno von**, alkaloids of *Hydrastis canadensis*, A., ii, 492.
- Burcker, E.**, synthesis of a new ketonic acid, A., i, 179.
- Burgess, Herbert E.** See *Alfred Chaston Chapmann*.
- Burrell, B. Arthur**, analysis of the water of the dropping well at Knaresborough, Yorkshire, T., 536; P., 1896, 73.
- Burri, R., E. Herfeldt, and Albert Stutzer**, causes of loss of nitrogen in decaying organic matter, A., ii, 445, 572.
- Busch, Max**, synthesis of biazoline derivatives, A., i, 190.
- benzylideneimide, A., i, 677.
- derivatives of hydrosulphamine, A., i, 705.
- Busch, Max, and Julius Becker**, action of nitrous acid on diphenylthiosemicarbazide, A., i, 581.
- Busch, Max** [and in part *Rud. Birk, Fr. Brand, F. Brunner, Francis E. Francis, Paul Hartmann, Fr. Heinen, and C. Volkening*], orthamidobenzylamine, A., i, 157.
- Busch, Max** [and *Karl Dietz*], orthamidobenzylamines, A., i, 507.
- Busch, Max, and Alfred Stern**, action of ammonia and amines on bisulphides, A., i, 677.
- Bushong, Frank W.**, benzimidooethyl ether and benzimidomethyl ether, A., i, 546.
- Busse, George J.** See *Carl D. Harries*.
- Busse, Walter**, examination of pepper, A., ii, 82.
- nutmeg, A., ii, 82.
- Byerley, J. H.** See *Charles Frederic Mabery*.
- C.**
- Cain, John Cannell**, note on the action of hydrogen chloride on ethylic alcohol, P., 1896, 12.
- Calvert, Harry Thornton, and Thomas Ewan**, colloidal chromosulphuric acid, P., 1896, 160.
- Calvert, James**, effect of drugs on the tracheal secretion, A., ii, 667.
- Calvert, Sydney**. See *Charles Loring Jackson*.
- Cambier, R.** See *André Brochet*.
- Camerer, William**, uric acid, xanthine bases, and phosphoric acid in human urine, A., ii, 379.
- Camerer, William**. See also *Friedrich Söldner*.
- Cameron, Alexander**, estimation of alkali salts in fireclays, manures, &c., A., ii, 392.
- Cameron, Frank Kenneth**. See *William Ridgeley Orndorff*.
- Camichel, Ch.** See *Pierre Henri Bayrac*.
- Campbell, Edward D.**, oxidation of some gases with palladinised copper oxide, A., ii, 171.
- Campbell, Edward D., and E. B. Hart**, estimation of hydrogen by means of palladious chloride, A., ii, 496.
- Campbell, George F.** See *Thomas Burr Osborne*.
- Campbell**. See *Hayes-Campbell*.
- Campenhausen, G. (Freiherr) von**. See *Karl Auwers*.
- Canaval, Richard**, altered biotite and tremolite from Styria, A., ii, 483.
- Cannizzaro, Stanislao**, congratulatory address to, P., 1896, 120.
- Cannizzaro, Stanislao, and Americo Andreocci**, dimethylnaphthols obtained from santonous acids, A., i, 483.
- Card, George William**, platinum, pickeringite, and magnesia-zinc-alum from New South Wales, A., ii, 251.
- celestite from Bourke, N.S.W., A., ii, 256.
- fuller's earth from Wingen, N.S.W., A., ii, 262.
- pickeringite from New South Wales, A., ii, 530.
- Carnegie, Douglas John, and H. Wales**, volumetric composition of ammonium chloride, A., ii, 558.
- Carnot, Adolphe**, bed of aluminium and potassium phosphates in Algeria, A., ii, 34.
- analysis of a mixture of chlorides, chlorates, and perchlorates, A., ii, 447.
- volumetric analysis of a mixture of chlorides, hypochlorites, and chlorates, A., ii, 447.
- crystals produced in the dephosphorisation of iron, A., ii, 522.

Jarnot, *Adolphe*, aluminium potassium phosphate, A., ii, 529.
 — variation in the composition of apatites, A., ii, 611.
 Jaro, *Nikodem*, synthesis of ethylic alcohol, A., i, 331.
 Jarpentier, *E.*, detection of paraffin in olive oil, A., ii, 452.
 Jarr, *Francis Howard*. See *Wyndham Rowland Dunstan*.
 Jarrara, *Giacomo*, electrolytic dissociation in solvents other than water, A., ii, 511.
 Jarrez, *C.*, new reaction for antipyrine and for quinine, A., ii, 584.
 Jasares, *José*, occurrence of fluorine in certain mineral waters, A., ii, 42.
 Castellaneta, *E.*, action of oxalic and malonic acids on paramidophenol and its ethers, A., i, 367.
 Castoro, *Nicola*, desmotroposantonin and the benzylsantonous acids, A., i, 307.
 Cattaneo, *Carlo*, electrical conductivity of salts dissolved in glycerol, A., ii, 231.
 Causse, *Henri Eugène*, phenylhydrazine tartrate and its derivatives, A., i, 479.
 — aldehydates of phenylhydrazine, A., i, 611.
 — estimation of organic nitrogen by the Kjeldahl process, A., ii, 72.
 — estimation of glucose, A., ii, 582.
 Cavalier, *Jacques*, measurement of the heat of formation of triethylic phosphate by the action of phosphorus oxychloride on sodium ethoxide, A., ii, 590.
 Cazeneuve, *Paul*, synthesis of carbamide and of symmetrical complex carbamides, A., i, 528.
 — preparation of glyceric acid, A., i, 596.
 — sterilisation of milk, and the lactic fermentation, A., ii, 120.
 — distinction between magenta and "acid magenta," A., ii, 630.
 Cazeneuve, *Paul*, and *E. Haddon*, trustworthiness of creamometers for the estimation of fat in Pasteurised milk, A., ii, 130.
 Cazeneuve, *Paul*, and *Moreau*, symmetrical carbamides of the benzene series, A., i, 544.
 Cellis, *E. de*. See *G. Basile*.
 Cesàro, *Giuseppe*, artificial precious opal, A., ii, 253.
 — alteration products of blende, A., ii, 479.
 — a silicate probably belonging to a new mineral species, A., ii, 481.

Chabrié, *Camille*, composition of water of the Pacific, A., ii, 117.
 Chalmot, *Guillame J. L. de*, silieides of iron, A., ii, 302.
 — silieides [of copper and silver], A., ii, 362.
 — calcium silieide, A., ii, 473.
 — crystalline silieon, A., ii, 560.
 Chambers, *A. D.* See *Harmon Northrup Morse*.
 Chapman, *Alfred Chaston* and *Herbert E. Burgess*, note on santal and some of its derivatives, P., 1896, 140.
 Charon, *Er.*, oxidation of crotonaldehyde, A., i, 407.
 — reduction of crotonaldehyde, A., i, 637.
 — crotonylic alcohol and its ethereal salts, A., i, 661.
 Charpy, *Georges*, mechanical properties of alloys of copper and zinc, A., ii, 170.
 — structure and constitution of alloys of copper and zinc, A., ii, 421.
 Chassevant, *Allyre*, action of metallic salts on the lactic fermentation, A., ii, 122.
 Chattaway, *Frederick D.*, the constitution of the so-called nitrogen iodide, T., 1572; P., 1896, 172.
 Chattaway, *Frederick D.*, and *Robert Cecil Turle Evans*, metadiethylbenzene, T., 848; P., 1896, 97.
 — — the diphenylbenzenes I. Metadiethylbenzene, T., 980; P., 1896, 113.
 Chelius, *Karl* [analyses of orthoclase from an Odenwald granite], A., ii, 612.
 Chesneau, *Gabriel*, temperature of the sparks produced by uranium, A., ii, 407.
 Chester, *Albert Huntington*, caswellite, an altered biotite from Franklin Furnace, N.J., A., ii, 309.
 — acanthite in Colorado, A., ii, 566.
 Chevastelon, *R.*, the inulin of garlic, hyacinth, narcissus, and tuberose, A., i, 5.
 Chikashigé, *Masumi*, the atomic weight of Japanese tellurium, T., 881; P., 1896, 151.
 Chiminello, *V.*, velocity of reaction between ethylic iodide and silver nitrate in ethylic and methylic alcohols, A., ii, 354.
 Chittenden, *Russell H.*, and *William J. Gies*, mucin of connective tissue, A., i, 456.
 Cho, *J.*, hydrogen peroxide in plants, A., ii, 60.
 Chrétien, *Paul*, combination of iodic acid with other acids, A., ii, 651.

- Chrustschoff, Konstantin von**, analyses of samarskite, pyrochlore, tantalite, and niobite [columbite], A., ii, 567.
- Ciamician, Giacomo Luigi**, and **Paul G. Silber**, alkaloids from the rind of pomegranate bark, A., i, 397.
- — — *n*-methyltropone, A., i, 397.
- — — tropinic acid, A., i, 513.
- — — angelica oil, A., i, 595.
- — — new apiole, A., i, 608.
- Claisen, Ludwig**, formamide and its derivatives, A., i, 91.
- — — action of ethylic orthoformate on ethereal salts of ketonic acids, on ketones, and on aldehydes, A., i, 463.
- Claisen, Ludwig** [and in part **L. Falk**, **John Bishop Tingle**, and **C. Kers-tiens**], 1 : 3-diketones, A., i, 557.
- Clark, T. H.** See **Arthur Michael**.
- Clarke, Frank Wigglesworth**, constitution of the lithia micas, A., ii, 37.
- — — garnet from California, A., ii, 38.
- Clarke, Thomas.** See **Frank P. Venable**.
- Claudel and J. Crochetelle**, effect of some substances used as manures on germination, A., ii, 442.
- Claus, Adolph**, tetramethylbenzoic acids, A., i, 230.
- — — carbostyryl and its derivatives : tautomerism, A., i, 449.
- — — 4-hydroxyquinoline, A., i, 449.
- Claus, Adolph**, and **Emil Dewitz**, 2 : 4 : 1-dinitrohydroxyquinoline, A., i, 654.
- Claus, Adolph**, and **Gabriel Hartmann**, 1 : 4-, 1 : 3-, and 2 : 4-dinitroquinoline, A., i, 391.
- Claus, Adolph**, and **Hans Howitz**, action of bromine on para- and ortho-hydroxyquinolines, A., i, 255.
- Claus, Adolph**, and **M. Huth**, meta-dihydroxyphenyl ketones, A., i, 227.
- Claus, Adolph**, [and in part **Karl Lodholz** and **Fritz Hirschbrunn**], 2 : 3- and 3 : 4-dibromoquinoline, A., i, 254.
- Claus, Adolph**, and **Emil Mohl**, alkyloxides of 1-hydroxyquinoline, A., i, 697.
- Claus, Adolph**, and **Ludwig Schnell**, 3-nitroquinoline and 3-amidoquinoline, A., i, 319.
- Claus, Adolph**, and **Eugen Setzer**, 4-nitro, 1-nitro-, 4-amido- and 1-amidoquinoline, A., i, 498.
- Clemm, Hans.** See **Theodor Curtius**.
- Clennell, J. E.**, estimation of simple cyanides in presence of complex cyanides and certain other substances, A., ii, 223.
- Clever, A.**, and **Wilhelm Muthmann**, compound of selenium with arsenic, A., ii, 18.
- Clever, A.**, and **Wilhelm Muthmann**, nitrogen sulphide, A., ii, 18.
- Cloedt, E. von.** See **Paul Ehrhardt Jannasch**.
- Cloetta, M.**, preparation and composition of hæmine hydrochloride, A., i, 66.
- Clowes, Frank**, the evolution of carbonic monoxide by alkaline pyrogall solution during absorption of oxygen, P., 1895, 200.
- — — the composition of the limiting explosive mixtures of various combustible gases with air, P., 1895, 201.
- — — explosion and detection of acetylene in air, P., 1896, 143.
- Coblitz, Franz.** See **Alfred Einhorn**.
- Cohen, Emil**, a salt lake in the Transvaal, A., ii, 436.
- Cohen, Ernst**, solubility of silver halogen salts in various solvents, A., ii, 16.
- — — the course of chemical reactions in gases, A., ii, 593.
- Cohen, Julius Behrend**, and **William Henry Archdeacon**, the action of sodium alcoholate on the acid amide T., 91 : P., 1896, 8.
- Cohn, Ludwig.** See **Arthur Rosenheim**.
- Cohn, Paul**, tetralkyldiamidoazonaphthalene, A., i, 100.
- — — orthobenzoylphenol [orthohydroxybenzophenone], A., i, 440.
- Cohn, Rudolph**, formation of a pyridine derivative from albumin by boiling with hydrochloric acid, A., i, 65.
- Cohnstein, Wilhelm**, theory of lymph formation, A., ii, 616.
- Collie, John Norman**, and **N. T. L. Wilsmore**, the production of naphthalene and of isoquinoline derivatives from dehydracetic acid, T., 293 : P., 1896, 47.
- Collie, John Norman**, and **William Ramsay**, behaviour of argon and helium when submitted to the electric discharge, A., ii, 633.
- Collie, John Norman.** See also **William Ramsay**.
- Colls, Percy Cooper**, creatinine, A., ii, 666.
- Colomba, Luigi**, glaucophane from Beaune, A., ii, 569.
- Colson, Albert**, preparation of amides and acid chlorides, A., i, 282.
- — — synthesis of complex amides, A., i, 283.
- — — preparation of acid fluorides, A., i, 346.
- — — freezing of solutions at constant temperature, A., ii, 157.

Colson, *R.*, action of zinc on the photographic plate, A., ii, 601.

Combes, *Charles*, preparation of silicochloroform, siliconbromoform, and triphenylsiliconprotane, A., i, 417.

— derivatives of triphenylsiliconprotane, A., i, 418.

— aluminium alloys, A., ii, 603.

Comey, *Arthur Messinger*. See *Charles Loring Jackson*.

Comstock, *William James*, use of antimony trichloride in the synthesis of aromatic ketones, A., i, 613.

Cone, *Edwin F.*, estimation of pyrrhotite in pyrites, A., ii, 543.

Conrad, *Max*, [and in part *L. Schmidt* and *Anton Kreichgauer*], halogen substitution derivatives of ethylic acetoacetate, A., i, 409.

Conti, *Carl*. See *Enrico Spizzichino*.

Cooksey, *Thomas*, basic sulphate of iron from Mount Morgan, Queensland, A., ii, 480.

Cooper, *William John*. See *James Alfred Wanklyn*.

Coppock, *John B.*, cupric sulphide, A., ii, 562.

Cornelson, *Arnold*, and *Stanislaus von Kostanecki*, action of aldehydes on ketones, A., i, 240.

Cossa, *Alfonso*, platomonodiamine compounds, A., ii, 251.

Coste, *John Henry* and *Ernest J. Parry*, nitration of bromobenzene, A., i, 352.

Cottrell, *F. G.* See *R. S. Norris*.

Couvreur, *E.*, transformation of fat into glycogen in the silkworm during metamorphosis, A., ii, 317.

Cownley, *Alfred John*. See *Benjamin Horatio Paul*.

Craig, *Andrew W.*, and *N. T. M. Wilsmore*, water from Lake Corangamite, Victoria, A., ii, 194.

Cripps, *Richard Augustus*, ipecacuanha, A., i, 395.

— assay of ipecacuanha, A., ii, 284.

Crismer, *Léon*, critical temperatures of solution: a new constant for the identification of oils, A., ii, 506.

Crochetelle, *J.* See *Claudel*.

Crocq, *J.*, cobalt in the sands of Woluwe-Saint-Lambert, A., ii, 434.

Crookes, *William*, spectrum of helium; A., ii, 1.

— spectrum of Ramsay's compound of carbon and argon, A., ii, 2.

Cross, *Charles Frederick*, constitution of pectins, A., i, 77.

Cross, *Charles, Frederick, Edward John Bevan*, and *Claud Smith*,

constitution of the cereal celluloses, T., 804; P., 1896, 95.

Cross, *Charles Frederick, Edward John Bevan*, and *Claud Smith*, carbohydrates of cereal straws, T., 1604; P., 1896, 174.

— — — chemistry of the barley plant, A., ii, 122.

Cserháti, *Alexander*, combustibility of tobacco, A., ii, 444.

Curci, *Antonio*, physiological action of thallium, A., ii, 491.

Curran, *J. Milne*, basalt from Bondi, N.S.W., A., ii, 40.

— a mineral spring at Bungonia, A., ii, 534.

Curtius, *Theodor*, benzazide (benzoylazoimide): acid azides of the fatty series, A., i, 34.

— hydrazide and azide (azoimide) of hippuric acid, A., i, 36.

— appendix to recent publications (benzoylhydrazines), A., i, 39.

— hydrazine, azoimide, and aliphatic diazo-derivatives, A., i, 337.

Curtius, *Theodor*, and *Hans Clemm*, replacement of carboxyl by amidogen, A., i, 464.

Curtius, *Theodor*, and *Ernst Davidis*, hydrazides and azides (azoimides) of the phthalic acids, A., i, 680.

Curtius, *Theodor*, and *Karl Heiderreich*, hydrazides and azides (azoimides) of carbonic acid, A., i, 143.

Curtius, *Theodor*, and *T. S. Hoffmann*, action of acid hydrazides on acid azides, A., i, 647.

Curtius, *Theodor*, and *E. Quedenfeldt*, symmetrical dibenzylhydrazine (hydraziphenylmethane), A., i, 28.

Cushman, *Allerton S.*, and *J. Hayes-Campbell*, volumetric estimation of lead, A., ii, 219.

Cybulski, *Gustav*. See *Carl Theodor Liebermann*.

D.

Daiber, *A.*, indican, indoxylsulphuric acid, and conjugated glycuronic acids in urine, A., ii, 491.

Daikuhara, *G.*, reserve protein in plants, A., ii, 55.

Dam, *W. van*, Kjeldahl's method and platinumchlorides, A., ii, 218.

Dambergis, *Anastasius K.*, the new hot springs at Ædipsos and Gialtra, A., ii, 535.

Damour, *Augustin Alexis*, florite, A., ii, 109.

— new analyses of chloromelanite, A., ii, 115.

- D'Arcy, Ralph Francis**, on certain views concerning the condition of the dissolved substance in solutions of sodium sulphate, T., 993; P., 1896, 104.
- Darling, Charles A.** See *James Young*.
- Darmstaedter, L.**, and *Isaac Lifschütz*, composition of wool fat. III. A., i, 198, 346, 522.
- Dastre, A.**, solubility of ferments and their activity in alcohol, A., i, 398.
— action of salts on the gastric digestion of fibrin and of acids on the saline digestion of fibrin, A., ii, 118.
— formation of glycogen in the animal organism, A., ii, 119.
— glycogen in the lymph, A., ii, 119.
- Dastre, A.**, and *N. Floresco*, liquefaction and saline digestion of gelatin, A., i, 196.
- Davidis, Ernst.** See *Theodor Curtius*.
- Davidson, William B.** See *Arthur Rudolf Hantzsch*.
- Davis, W. E.** See *George O. Higley*.
- Davy, S. W. M.**, obituary notice of, T., 733.
- Dawydow, L.**, testing for arsenic in the presence of selenium, A., ii, 219.
- Debus, Heinrich**, the origin of Dalton's atomic theory, A., ii, 639.
- Deeley, R. M.**, helium and argon, and their places among the elements, A., ii, 418.
- Defren, George**, preparation of par-ethyltoluene and its derivatives, A., i, 90.
- Dehérain, Pierre Paul**, effect of carbon bisulphide and of horse dung on denitrification, A., ii, 329.
— field experiments [with wheat and barley] at Grignon in 1895, A., ii, 331.
- Deicke, Bernhard.** See *Eugen Bamberger*.
- Deinert, J.**, conversion of nitriles into amides by hydrogen peroxide, A., i, 149.
- Delacre, Maurice**, triphenylethanone and triphenylethanolone, A., i, 485.
— hydrogenation of pinacolin, A., i, 591.
— constitution of pinacolin, A., i, 662.
- Delafontaine, Marc**, colloïd compounds of rare metals, A., ii, 562.
- Delafontaine, Marc**, and *Charles Elijah Linebarger*, reaction between carbon tetrachloride and the oxides of niobium and tantalum, A., ii, 653.
- Delépine, Marcel**, hexamethylenetetramine mercuriochlorides and mercuriodide, A., i, 78.
- Delépine, Marcel**, separation of methylamines, A., i, 519.
— preparation of methylic nitrate, A., i, 586.
— methylamines, A., i, 588.
— action of water on formaldehyde, A., i, 637.
- Deligny.** See *Camille Matignon*.
- Delvalez, G.**, parasite electrodes, A., ii, 407.
- Demarçay, Eugène Anatole**, new element in rare earths of the Samarium group, A., ii, 475.
- Demeler, Karl.** See *Carl Paal*.
- Denigès, Georges**, the resorcinol test for tartaric acid, A., ii, 80.
— characteristic colour reaction for chlorates, A., ii, 332.
— three new reagents for nitrites, A., ii, 336.
— a new cyanometric method and its applications, A., ii, 385.
- Dennstedt, Maximiliano** and *César Ahrens*, estimation of sulphurous anhydride and sulphuric acid in the products of combustion of coal gas, A., ii, 217.
- Desgrez, Alexandre**, unsaturated hydrocarbons, A., i, 2.
— new synthesis of some aromatic nitriles, A., i, 419.
- Deslandres, Henri**, absorption of nitrogen by lithium at the ordinary temperature, A., ii, 299.
- Dewar, James**, the liquefaction of air, and research at low temperatures, P., 1895, 221; discussion, *ibid.*, 231.
- Dewar, James**, and *John Ambrose Fleming*, thermoelectric powers of metals and alloys at low temperatures, A., ii, 4.
— electrical resistance of bismuth at low temperatures, A., ii, 5.
- Dewitz, Emil.** See *Adolph Claus*.
- Diacon.** See *Fonzes-Diacon*.
- Diamant, Julius**, direct introduction of hydroxyl-groups into hydroxyquinolines, A., i, 105.
- Dibdin, William Joseph**, microscopical examination of water, A., ii, 341.
- Dickson, Edmund.** See *Philip Holland*.
- Didier, Gaston**, basic magnesium nitrate, A., ii, 474.
- Diepolder, Emil**, 3 : 4-nitrohydroxybenzoic acid, A., i, 615.
- Dierbach, R.**, a new Bunsen burner, A., ii, 415.
- Dieterici, Konrad**, dependence of the specific heat of water on the temperature, A., ii, 232.

- Dietrich, *H.*, water from Klebelsberg Spring, Ischl, A., ii, 435.
- Dietz, *Karl*. See *Max Busch*.
- Dischinger, *A.* See *Otto Fischer*.
- Divers, *Edward*, and *Tamemasa Haga*, the reduction of nitrososulphates, T., 1610; P., 1896, 179.
- imidosulphonates. Part II. T., 1620; P., 1896, 179.
- amidosulphonic acid, T., 1634; P., 1896, 180.
- the economical preparation of hydroxylamine sulphate, T., 1665; P., 1896, 178.
- Dixon, *Augustus Edward*, the chemistry of dibromopropylthiocarbimide and the action of bromine and iodine on allylthiourca, T., 17; P., 1895, 215.
- halogen additive products of substituted thiosinamines, T., 851; P., 1896, 99.
- acidic thiocarbimides, thioureas, and ureas, T., 855; P., 1896, 100.
- Dixon, *Harold Baily*, the mode of formation of carbonic acid in the burning of carbon compounds, T., 774; P., 1896, 55.
- Dixon, *Harold Baily*, and *H. Brereton Baker*, the chemical inactivity of the Röntgen rays, T., 1308; P., 1896, 160.
- Dixon, *Harold Baily*, and *J. A. Harcker*, on the detonation of chlorine peroxide, T., 789; P., 1896, 57.
- Dixon, *Harold Baily*, *E. H. Strange*, and *Edward Graham*, the explosion of cyanogen, T., 759; P., 1896, 53.
- Dobrin, *Carl*. See *Leopold Spiegel*.
- Dobriner, *Paul*, and *Wilhelm Schranz*, estimation of small amounts of aniline in toluidine and of toluidine in aniline, A., ii, 402.
- estimation of water in aniline and ortho and para-toluidine, A., ii, 403.
- estimation of sulphuric anhydride in fuming sulphuric acid: estimation of sodium sulphide, A., ii, 672.
- Doherty, *W. M.*, apparatus for the detection of boric acid, P., 1896, 101.
- arsenic in coal, A., ii, 566.
- Donnath, *Eduard*, action of water, &c., on aluminium, A., ii, 563.
- chemistry of iron, A., ii, 563.
- Donnan, *Frederick George*, electrolytic dissociation and light absorption, A., ii, 405.
- Doran, *Robert Elliot*, the action of lead thiocyanate on the chlorocarbonates. Part I. Carboxyethylthiocarbamide and its derivatives, T., 1324; P., 1896, 74.
- Dorant, *K.* See *Carl Engler*.
- Dorn, *Ernst*, and *Hugo Erdmann*, argon and its fluorescence spectrum, A., ii, 2.
- Dorp, *William Arne van*. See *Sebastian Hoogewerff*.
- Dorrance, *John J.* See *Arthur Amos Noyes*.
- Dott, *David Brown*, assay of opium, A., ii, 283.
- Dougal, *Margaret Douie*, the effect of heat on aqueous solutions of chrome alum, T., 1526; P., 1896, 183.
- Dragendorff, *Georg*, forensic chemistry, A., ii, 278.
- Drechsel, *Edmund*, the separation of lysine, A., i, 268.
- chemistry of some marine animals, A., ii, 378.
- Dubbers, *H.*, experiments on the citrate-solubility of basic slags, A., ii, 673.
- Dubois, *H.*, new salts of guaiacol, A., i, 152.
- DuBois, *H. W.* See *C. T. Mixer*.
- Duclaux, *Emile*, estimation of alcohols and volatile acids, A., ii, 504.
- Duden, *Paul*, and *Max Scharff*, constitution of hexamethylenetetramine, A., i, 122.
- Dudley, *William L.*, relationship of the heats of vaporisation of gases to their density and also to their boiling points, A., ii, 289.
- Düll, *Georg*, action of oxalic acid on inulin, A., i, 120.
- Düsterbehn, *Fr.* See *Paul Jacobson*.
- Dufau, *Em.*, normal calcium chromite, A., ii, 167.
- barium tetrachromite, A., ii, 524.
- magnesium cobaltite, A., ii, 647.
- Dufau, *Em.* See also *Gustave Patein*.
- Dunlap, *Frederick L.*, action of carbamide and thiocarbamilide on acid anhydrides, A., i, 471.
- Dunlap, *Frederick L.* See also *Charles Loring Jackson*.
- Dunlop, *James Crauford*, excretion of oxalic acid, A., ii, 263.
- action of dilute acids on metabolism, A., ii, 484.
- Dunn, *Orton C.* See *Charles Frederic Mabery*.
- Dunstan, *Wyndham Rowland*, and *Francis Howard Carr*, note on piperovatine, P., 1895, 177.
- dibenzaconine and tetracetyl-aconitine, P., 1895, 178.
- note on a difficulty in the deter-

- mination of nitrogen by the absolute method, P., 1896, 48.
- Dunstan**, *Wyndham Rowland*, and *Ernest Goulding*, the hydriodides of hydroxylamine, T., 839; P., 1896, 72.
- Dunstan**, *Wyndham Rowland*, *Thomas Tickle*, and *David Hamilton Jackson*, the action of methylic alcohol on aconitine. Formation of methylbenzaconine, P., 1896, 159.
- Dupasquier**, *J.*, separation of calcium from strontium and barium, A., ii, 450.
- Dupont**, *Justin*, existence of a sulphur compound in cotton-seed oil, A., i, 409.
- detection of cotton-seed oil in American lards, A., ii, 455.
- Durkee**, *Frank W.*, oxidation of sodium sulphide and hydrosulphide to sulphate by electrolysis, A., ii, 559.
- Durrant**, *Reginald D.*, on a new compound of cobalt, and a rapid method of detecting cobalt in presence of nickel, P., 1896, 96.
- Duvillier**, *Edouard*, α -dimethylamidocaproic acid, A., i, 80.
- methylethylhydantoin (ethylpropiohydantoin), A., i, 89.
- Dyes**, *W. A.* See *Friedrich Krafft*.
- E.**
- Eakins**, *L. G.*, analysis of ottrelite, pyroxene, garnet, epidote, scolecite, and xenotime, A., ii, 39.
- Easterfield**, *Thomas Hill*. See *Thomas Barlow Wood*.
- Eberhard**, *Otto*, chloro-derivatives of $\alpha\alpha$ -dithienyl, A., i, 16.
- Ebert**, *Robert*, condensation of orthophthaldehydic acid with dimethylaniline, A., i, 441.
- Ebner**, *Victor von*, reversal of the double refraction of gelatin-producing tissues by various reagents, A., ii, 457.
- Ebstein**, *Wilhelm*, and *Arthur Nicolaier*, excretion of uric acid by the kidneys, A., ii, 379.
- Eckenroth**, *Hugo*, analysis of galena, A., ii, 501.
- Eckenroth**, *Hugo*, and *Karl Klein*, action of some halogen compounds containing oxygen on sodium benzoisulphinide ("saccharin"), A., i, 304.
- Eckenroth**, *Hugo*, and *Georg Koerppe*, derivatives of orthobenzoisulphinide ("saccharin"), A., i, 438.
- Edeleanu**, *Lazar*, and *Enescu*, action of nitrosodimethylaniline on trihalogen substituted phenols, A., i, 359.
- Edeleanu**, *Lazar*, and *Al. Zaharia*, action of chloral on hydroxy-acids in presence of sulphuric acid, A., i, 348.
- Eder**, *Josef Maria*, flames and illuminating gases, A., ii, 287.
- Eder**, *Josef Maria*, and *A. Valenta*, different spectra of mercury, A., ii, 2.
- Eder**, *Josef Maria*, and *Ednard Valenta*, three different spectra of argon, A., ii, 405.
- Edinger**, *Albert*, iodoisoquinoline: the two isomeric iodophthalic acids, A., i, 502.
- Edmunds**, *Arthur*, rennin and milk curdling, A., ii, 489.
- Edwards**, *Arthur M.*, solubility of silica, A., ii, 246.
- Edwards**, *Vincent*, rapid estimation of insoluble phosphate, A., ii, 273.
- Egeling**, *Cornelis Guldensteeden*, detection of lead and copper in potable water, A., ii, 549.
- Eggert**, *A.* See *Julius Throeger*.
- Ehrich**, *E.*, nitrogen compounds of malt and beer worts, A., ii, 540.
- Eichleiter**, *C. Friedrich*, natrolite from Moravia, A., ii, 482.
- Eichleiter**, *C. Friedrich*. See also *Conrad H. von John*.
- Eickelberg**, *H.* See *Ernst Beckmann*.
- Eijkman**, *C.*, gaseous exchange in inhabitants of the Tropics, A., ii, 661.
- Eijkman**, *Johan Frederik*, refractometric observations, A., ii, 133.
- Einhorn**, *Alfred*, reduction of the benzylaminecarboxylic [exoamidotoluic] acids, A., i, 551.
- Einhorn**, *Alfred*, and *Benjamin S. Bull*, orthohexamethylenediamine, A., i, 472.
- Einhorn**, *Alfred*, [and *Franz Coblitz*], reduction of phenolcarboxylic acids. II. A., i, 530.
- Einhorn**, *Alfred*, and *John S. Lumsden*, reduction of phenolcarboxylic acids, A., i, 45.
- Einhorn**, *Alfred*, and *Penoyer Sherman*, quinoline derivatives substituted in the nitrogen ring, A., i, 61.
- Ekenstein**. See *Alberda van Ekenstein*.
- Elbs**, *Karl*, persulphuric acid, A., ii, 519.
- Elbs**, *Karl*, and *E. Brunnschweiler*, preparation of trichlorotoluquinone, A., i, 214.
- Elbs**, *Karl*, and *O. Schönherr*, formation of persulphuric acid, A., ii, 519.

- lion, *Hartog*, estimation of the dry substance in malt wort and beer, A., ii, 395.
- llinger, *Alexander*, nutritive value of gland peptone, A., ii, 536.
- lliot, *Walter John*, action of chloroform and potassium hydroxide on metamidobenzoic acid, T., 1513; P., 1896, 171.
- llis, *Rolfe M.* See *Arthür Amos Noyes*.
- llms, *J. W.* See *Ellen H. Richards*.
- mery, *William Orren*, two isomeric ketodicarboxylic acids, A., i, 413.
- action of ethylic β -bromolevulinic acid on ethylic sodiomalonate, A., i, 414.
- ethylic α - and β -benzoyltricarballoylates, A., i, 436.
- action of ethylic sodacetoacetate on ethylic bromolevulinate, A., i, 638.
- nmerring, *Oskar*, thiorufic acid and thiocarbacetoacetic acid, A., i, 127.
- enamel, A., ii, 523.
- magnesium nitride, A., i, 591.
- rescu. See *Lazar Edeleanu*.
- ngel, *Rodolphe Charles*, action of hydrochloric acid on copper, A., ii, 171.
- ngel, *Rodolphe Charles*, and *J. Bernhard*, estimation of arsenic, A., ii, 448.
- ngels, *Carl*, estimation of manganese and tin by electrolysis, A., ii, 276.
- ngels, *E.* See *Alfred Stavenhagen*.
- ngler, *Carl*, and *K. Dorant*, formation of indigo by the action of sunlight, A., i, 49.
- ngler, *Carl*, and *L. Jezioranski*, elementary composition of the mineral oils, A., i, 1.
- ngler, *Carl*, and *W. Wild*, ozone, A., ii, 558.
- separation of ozone from hydrogen peroxide and recognition of ozone in the atmosphere, A., ii, 574.
- hrussi, *S.* See *Pavel I. Petrenko-Kritschenko*.
- imann, *Hugo*, occurrence of amino-aciacal nitrogen in ancient igneous rocks, A., ii, 570.
- imann, *Hugo*, and *P. Huth*, rhodinol or geraniol, A., i, 198.
- imann, *Hugo*. See also *Ernst Dorn*.
- enmeyer, *Emil*, isomeric bromonamic acids and cinnamic acids, A., i, 46.
- phenylchloriodopropionic acid and derivatives, A., i, 302.
- enmeyer, *Emil, jun.*, the diphenylhydroxyethylamine bases, A., i, 305.
- , *H. van*, action of fused potash on ethylnitramine and dimethylnitramine, A., i, 275.
- OL. LXX. ii.
- Erp, *H. van*. See also *Antoine Paul Nicolas Franchimont*.
- Errera, *Giorgio*, action of hydroxylamine on succinic anhydride, A., i, 209.
- action of hydroxylamine on methylic phthalate, A., i, 222.
- action of hydroxylamine on ethylic succinate, A., i, 286.
- α -dialkylhydantoins, A., i, 523.
- Errera, *Giorgio*, and *E. Bertè*, derivatives of phenolphthaleïn, A., i, 564.
- Ertschikowsky, *Georg*. See *Georg Wagner*.
- Erzbach. See *Müller-Erzbach*.
- Eschenbach, *G.* See *Carl D. Harries*.
- Esson, *William*. See *Augustus George Vernon Harcourt*.
- Estreicher, *Thaddeus*, pressure of saturation of oxygen, A., ii, 150.
- Étard. See *Henri Moissan*.
- Étard, *Alexandre Léon*, molecular origin of the absorption bands of salts of cobalt and of chromium, A., ii, 133.
- Euler, *Wilhelm*, synthesis of β -methylpentamethylenecarboxylic acids, A., i, 145.
- Evans, *Clara de Brereton*, researches on tertiary benzenoid amines. I. Derivatives of dimethylaniline, P., 1895, 235.
- Evans, *P. S.* See *Frank Austin Gooch*.
- Evans, *Robert Cecil Turle*. See *Fredrick D. Chattaway*.
- Eve, *F. C.*, the basophil constituent of sympathetic nerve cells, A., ii, 633.
- Ewan, *Thomas*, note on the electrolytic conductivity of formanilide and thioformanilide, T., 93; P., 1896, 8.
- Ewan, *Thomas*. See also *Harry Thornton Calvert*.
- Ewell, *Erwin E.*, chemistry of the Caetaceæ, i, 709.
- Ewell, *Erwin E.* See also *Harvey Washington Willey*.
- Ewing, *Arthur R.* See *Karl Auwers*.
- Eykman. See *Eijkman*.

F.

- Fabian, *O.* See *Paul Jacobson*.
- Fabre, *Charles*, estimation of potassium, A., ii, 624.
- Fagard, *A.*, metallic bisulphite compounds of aldehydes, A., i, 39.
- Fajans, *A.*, synthesis of vanillin, A., i, 368.
- Falk, *Edmund*, derivatives of hydrastine and narcotine, A., ii, 230.
- Falk, *L.* See *Ludwig Claisen*.

- Falkenberg, *H.* See *Heinrich Limpricht*.
- Farrington, *Oliver Cummings*, Jadeite from Mogoung, Burma, A., ii, 311.
- Faure, *Camille*, calcium cyanate, a nitrogenous manure, A., i, 113.
- Favrel, *G.*, action of propylic, butylic, and amylie sodiocyanacetates on diazobenzene chloride, A., i, 479.
- Fay, *Henry*, action of light on organic acids, in presence of uranium salts, A., i, 464.
- Fayolle, *M.* See *Antoine Villiers*.
- Feilitzen, *C. von*, importance of potash as plant food, A., ii, 269.
- Feist, *Franz*, and *Hugo Arnstein*, aromatic homologues of ethylenediamine, A., i, 258.
- Feliciani, *G.*, acid spring near Rome (Ponte Molle), A., ii, 615.
- Fenton, *Henry John Horstman*, the constitution of a new dibasic acid resulting from the oxidation of tartaric acid, T., 546; P., 1896, 67.
- Férée, *Jules*, chromium amalgam and some properties of chromium, A., ii, 303.
- molybdenum amalgam and some properties of molybdenum, A., ii, 476.
- Fermi, *Claudio*, and *Giuseppe Montesano*, inversion of cane sugar by means of micro-organisms, A., ii, 493.
- Ferrand, *Lucien*, thiophosphites, A., ii, 418.
- thiophosphates, A., ii, 473.
- Fertsch, *F. K.* See *Paul Jacobson*.
- Fichter, *Fritz*, and *A. Herbrand*, new method of preparing aliphatic lactones, A., i, 463.
- Filehne, *Wilhelm*, and *Heinrich Kionka*, respiratory metabolism, A., ii, 118.
- Filsinger, *F.*, iodine number of cacao butter, A., ii, 680.
- Fischer, *Emil*, glucoseacetone, A., i, 4.
- formation of methyluric acids from theobromine, A., i, 12.
- sugars richer in carbon from galactose, A., i, 117.
- isomaltose, A., i, 119.
- new synthesis of oxazoles, A., i, 262.
- crystallised anhydrous rhamnose, A., i, 272.
- azophenylethyl [benzeneazoethane] and acetaldehydephenylhydrazones, A., i, 361.
- the configuration of dextrotartaric acid, A., i, 525.
- hydroxy-2'-phenylindole and nitrosobenzoic acid, A., i, 696.
- Fischer, *Emil*, and *Lorenz Ach*, new synthesis of uric acid and of its methyl derivatives, A., i, 12.
- Fischer, *Emil*, and *Lorenz Ach*, thiocompounds of the uric acid group, A., i, 141.
- — synthesis of caffeine, A., i, 263.
- Fischer, *Emil*, and *Otto Bromberg*, a new pentonic acid and pentose, A., i, 548.
- — lyxonic acid, A., i, 667.
- Fischer, *Emil*, and *Heinrich Herborn*, isorhamnose, A., i, 587.
- Fischer, *Emil*, and *Paul Lindner*, enzymes of certain yeasts, A., i, 195.
- Fischer, *Emil*, and *W. Niebel*, behaviour of polysaccharides with certain animal secretions and organs, A., ii, 665.
- Fischer, *Emil*, and *Arthur Speier*, preparation of ethereal salts, A., i, 201.
- Fischer, *Otto*, formation of phenazines, A., i, 628.
- constitution of the safranines, A., i, 628.
- Fischer, *Otto*, and *Rob. Albert*, naphthazines, A., i, 701.
- Fischer, *Otto*, and *A. Dischinger*, oxidation products of orthamidodiphenylamine [phenylorthophenylenediamine], A., i, 539.
- Fischer, *Otto*, and *Eduard Hepp*, relation of the indulines to the safranines, A., i, 50.
- — action of alkalis on paranitrotoluenesulphonic acid, A., i, 51.
- — indulines and safranines, A., i, 323.
- — oxidation products of orthamidodiphenylamine [phenylorthophenylenediamine], A., i, 539.
- Fittig, *Rudolph*, intramolecular change in unsaturated acids. The isomeride of pyrocinehonic [dimethylmaleic acid, A., i, 599.
- Fittig, *Rudolph*, and *Adolf Wolff*, isopropylglutolactonic acid: constitution of terpenylic acid, A., i, 135.
- Fittig, *Rudolph*, *Adolf Wolff*, and *Rudolph Lesser*, action of sodium ethoxide on phenylbutyrolactone, A., i, 171.
- Fittig, *Rudolph*, *Adolf Wolff*, and *John Shields*, products of the reduction of phenylbutyrolactone and phenylparaconic acid, A., i, 170.
- Fitzgerald, *George Francis*, Helmholtz Memorial Lecture, T., 885; P., 1896, 26; discussion, *ibid.*, 26.
- Flawitzky, *Flavian M.*, function cor

- responding with the periodicity of the properties of the elements, A., ii, 355.
- leissner, *Franz*. See *Eduard Lippmann*.
- leming, *John Ambrose*. See *James Dewar*.
- lemming, *Hugo*, properties of dichlorhydrin, A., i, 333.
- leurent, *Émile Charles Albert*, constitution of vegetable proteïds, A., i, 111.
- link, *Gustav*, kentrolite from Långban, A., ii, 186.
- intermann, *R. F.*, and *Albert B. Prescott*, dipyridine trimethylene dibromide, A., i, 317.
- loresco, *N.* See *A. Dastre*.
- lock, *Andreas*, size of crystalline molecules, A., ii, 160.
- loerster, *Fritz*, alloys of copper and tin, A., ii, 177.
- loerster, *Otto*, action of thiosinamine [allylthiocarbamide] on mercuric iodide in presence of ammonia, A., i, 414.
- estimation of oil of mustard, A., ii, 452.
- lorenzen-Diacon, preparation of glycerose, A., i, 459.
- lotte, *H. W.*, pollucite, manganocolumbite, and microlite from Rumford, Maine, A., ii, 660.
- lotte, *H. W.* See *Horace Lemuel Wells*.
- lotte, *Warren M.*, leadhillite pseudomorphs in Missouri, A., ii, 35.
- northupite, a new mineral, A., ii, 184.
- lobbes, *E. H.*, epidote from Huntington, Mass.; and the optical properties of epidote, A., ii, 371.
- lobbes, *E. H.* See also *Samuel Lewis Penfield*.
- lohmánek, *Emanuel*, identification of alkaloids and glucosides, A., ii, 401.
- loster, *Martin Onslow*, studies of the terpenes and allied compounds. New derivatives of α -dibromocamphor, A., 36; P., 1895, 207.
- preliminary note on a new base derived from camphoroxime, P., 1896, 45.
- lovey, *Emily C.* See *Arthur Richardson*.
- lön, *Heinrich von*, asbestos from Bosnia, A., ii, 483.
- loqué, *Ferdinand*, felspars of igneous rocks, A., ii, 532.
- lorenier, *H.*, preparation of ethylenic hydrocarbons, A., i, 457.
- loer, *Gilbert John*. See *Harold Alden Auden*.
- Fränkel, *Sigmund*, thyreo-antitoxin, A., ii, 119.
- Framm, *Friedrich*. See *Otto Nasse*.
- Francesconi, *Luigi*, santonic acid and its derivatives, A., i, 377.
- Franchimont, *Antoine Paul Nicolas*, action of nitric acid on methylamides and dimethylamides, A., i, 601.
- Franchimont, *Antoine Paul Nicolas*, and *H. van Erp*, reduction products of methylbutylnitramine, A., i, 275.
- — nitramines, A., i, 297.
- — action of nitric acid on oxal-piperidide, A., i, 602.
- Franchimont, *Antoine Paul Nicolas*, and *H. J. Taverne*, action of nitric acid on certain piperidides, A., i, 602.
- Francis, *Francis E.*, orthodinitro-dibenzylbenzidine and some of its derivatives, A., i, 562.
- Francis, *Francis E.* See also *Max Busch*.
- Franco, *Pasquale*, amphibole [hornblende] and sodalite from the trachyte of Montesanto, Naples, A., ii, 313.
- François, *Maurice*, action of aniline on mercurous iodide, A., i, 22.
- action of phenol on mercurous iodide, A., ii, 248.
- action of alcohol on mercurous iodide, A., ii, 301.
- action of heat on mercurous iodide, A., ii, 363.
- Franke, *Adolf*, action of alcoholic potash on isobutaldehyde, A., i, 404.
- Frankland, *Percy Faraday*, and *John MacGregor*, on some of the ethereal salts of active and inactive monobenzoyl-, dibenzoyl-, diphenylacetyl-, and dipropionyl-glyceric acids, T., 104; P., 1896, 9.
- Frankland, *Percy Faraday*, and *Robert Howson Pickard*, rotation of optically active compounds in organic solvents, T., 123; P., 1896, 11.
- Frankland, *Percy Faraday*, and *Frederick Malcom Wharton*, position isomerism and optical activity. The methylic and ethylic salts of ortho-, meta-, and para-ditoluyltartaric acids, T., 1309; P., 1896, 148.
- — position isomerism and optical activity. The comparative rotatory powers of the dibenzoyl- and ditoluyltartrates, T., 1583; P., 1896, 186.
- Franklin, *Edward C.* See *Edgar Henry Summersfield Bailey*.
- Franz, *Boh.* See *Karl Zulkowski*.
- Fraser, *Thomas Richard*, and *Joseph Tillie*, *Acokanthera Schimperii*, A., i, 386.

- Freer, Paul C.**, action of sodium on acetaldehyde, A., i, 589.
 — apparatus for distillation in a vacuum, A., ii, 557.
 — apparatus for demonstrating that two volumes of hydrogen and one volume of oxygen form two volumes of water vapour, A., ii, 558.
Freer, Paul C. [and, in part, *E. R. Miller*], tetrinic [tetric] acid, A., i, 277.
Freer, Paul C. and **P. L. Sherman**, jun., constitution of derivatives of formic acid, A., i, 611.
Freese, Hans. See *Arthur Rudolf Hantzsch*.
Frenzel, August, serpierite, lautite and pseudobrookite, A., ii, 111.
Fresenius, Carl Remigius, analysis of the Victoria spring, at Oberlahnstein, A., ii, 315.
 — variation in composition of mineral waters at different periods, A., ii, 435.
Fresenius, Carl Remigius, and **Ernst Hintz**, solubility of barium sulphate, A., ii, 499.
 — — examination of commercial thorium nitrate and separation of thorium and cerium, ii, 677.
Fresenius, Heinrich, and **C. J. S. Makin**, estimation of phenol in soaps and disinfectants, A., ii, 580.
Freund, Martin, history of aconitine, A., i, 192.
Freund, Martin, and **R. L. Heilbrun**, action of hydrochloric acid on hydrazodicarbothioallylamide, A., i, 415.
Freund, Martin, and **Robert Niederhofheim**, pseudaconitine, A., i, 451.
Freundler, Paul, decomposition of dihydroxystearic acid into its optically active constituents, A., i, 596.
 — chlorinated ethereal tartrates, A., ii, 553.
Frey, Hg., formation of triphenylcarbinol, A., i, 99.
 — formation of nickel carbonyl, A., ii, 107.
Freyer, Franz, estimation of formic acid, A., ii, 80.
Friedel, Charles, artificial boleite, A., ii, 32.
 — artificial percyllite, A., ii, 32.
 — artificial martite, A., ii, 110.
Friedel, Georges, zeolites and the substitution of various substances for the water they contain, A., ii, 481.
 — a new artificial silicate, A., ii, 482.
 — analcite, A., ii, 482.
Friedheim, Carl and **Paul Michaelis**, gravimetric estimation of arsenic, A., ii, 74.
Friedländer, Georg, absorption of proteids in the small intestine, A., ii, 536.
Friedländer, Paul, and **W. H. Kielbasinski**, isomeric naphthalene derivatives. IV. diamidonaphthalene-sulphonic acids, A., i, 692.
Friedländer, Paul, and **Herman Rüdte**, preparation of flavone derivatives A., i, 439.
 — — isomeric naphthalene derivatives. III, A., i, 568.
 — — flavone derivatives. II. A., i, 607.
Friedländer, Paul and **S. Zinberg**, some 1:2'-derivatives of naphthalene A., i, 244.
Friedländer, Siegfried, argon, A., ii, 457.
Fritsch, M. See *C. Schraube*.
Fritz, Victor, derivatives of benzoylcarbinol and of diphenacyl, A., i, 151.
 — preparation of diphenacyl, A., i, 151, 619.
Fritzsche, P., estimation of ethylene in gaseous mixtures, ii, 678.
Fromme, Johannes, minerals (zeolites &c.) of a Thuringian amphibole granitite, A., ii, 370.
Frye, Colin C., oxidising substance produced by distilling aqueous potassium permanganate and sulphuric acid in a vacuum, A., ii, 417.
Fuchs, Gotthold. See *Ernst Beckmann*.
Fuchs and Schiff, acids obtained in refining petroleum, A., i, 351.
Fühner, Hermann. See *Friedrich Kehrman*.
Fürth, Otto von, proteids of muscle plasma, A., ii, 48.
Funk, Robert, sulphur and carbon in zinc, A., ii, 247.
 — estimation of sulphur and carbon in zinc, A., ii, 274.

G.

- Gaab, Carl.** See *Carl Hell*.
Gabriel, Siegmund and **Robert Stelzner**, vinylamine, A., i, 121.
 — orthonitrobenzylic mereaptan, A., i, 215.
 — — 3-methylindazole, A., i, 320.
 — — quinazoline compounds, A., i, 506.
 — — hydroxyl and halogen derivatives of secondary and tertiary bases, A., i, 702.
Gadamer, J., thiosinamine (allylthiocarbamide) and its halogen additive products. II., A., i, 140.

- adamer, *J.*, thiosinamine (allylthiocarbamide). III. A., i, 414.
- ain, *E.*, amount of substances soluble in water in plants, A., ii, 268.
- allivan, *F. B.* See *Charles Loring Jackson*.
- alloway, *Robert*, obituary notice of, T., 733.
- amgee, *Arthur*, absorption of the extreme violet and ultra-violet rays of the solar spectrum by hæmoglobin, its compounds, and certain of its derivatives, A., i, 713.
- relations of turacin and turacoporphyrin to the colouring matter of the blood, A., i, 714.
- anser, *Fritz*. See *Carl Paal*.
- ardner, *John Addyman*. See *James Ernest Marsh*.
- arelli, *Felice*, influence of the chemical constitution of organic compounds on their capability of forming solid solutions, A., ii, 157.
- cryoscopic behaviour of substances of similar constitution to the solvent, A., ii, 292.
- exceptions to the law of freezing point depressions, A., ii, 292.
- solid solutions formed by non-isomorphous substances, A., ii, 469.
- arroed, *Archibald Edward*, and *F. Gowland Hopkins*, urobilin, A., ii, 712.
- — hæmatoporphyrinuria, A., ii, 264.
- assman, *Charles*, derivatives of eugenol, A., i, 424.
- peridinitronaphthalene, A., i, 486.
- formation of dinitronaphthalenes. II., A., i, 566.
- atterman, *Ludwig*, coloured aromatic thioketones, A., i, 172.
- autier, *Emile Justin Armand*, genesis of natural phosphates and nitrates, A., ii, 185.
- estimation of arsenic, A., ii, 449.
- autier, *Emile Justin Armand*, and *H. Hélier*, conditions which regulate the combination of gases. Union of oxygen and hydrogen at low temperatures, A., ii, 416.
- autier *Ferdinand*, formation of tinveins, A., ii, 529.
- autier, *Henri*, fusibility of metallic alloys, A., ii, 602.
- alloys, A., ii, 616.
- autier, *Henri*. See also *Henri Moissan*.
- aelmuyden, *H. Chr.*, new baryta tube, A., ii, 674.
- Messinger's method of estimating acetone, A., ii, 679.
- Geikie, *Sir Archibald*, and *J. J. Harris Teall*, banded gabbros of skye, A., ii, 191.
- Gemesus, *A.* See *Alfred Werner*.
- Generoso, *A.* See *Nicolai D. Zelinsky*.
- Gennari, *G.*, rotatory dispersion of nicotine and its salts, A., ii, 286.
- velocity of hydrolysis in organic solvents, A., ii, 413.
- Gennari, *G.* See also *Raffaele Nasini*.
- Gentil, *Louis*, apophyllite from Algeria, A., ii, 114.
- andradite-garnet from Algeria, A., ii, 115.
- Georgenburger, *Jeannot*, hæmoglobin and its derivatives, A., ii, 485.
- Georges, "quinine chorhydro-sulphate," A., i, 655.
- estimation of alum in wines, A., ii, 451.
- Georgievics, *Georg von*, coloured rosaniline bases, A., i, 441, 690.
- Gérard, *Ernest*, the cholesterols of cryptogams, A., i, 21.
- decomposition of amygdalin in the animal system, A., ii, 570.
- fermentation of uric acid by microorganisms, A., ii, 668.
- Gerichten. See *Vongerichten*.
- Gerilowski, *Dimiter*, stereoisomeric salts of orthodiazobenzenesulphonic acid, A., i, 439.
- Gerilowski, *Dimiter*, and *Arthur Rudolf Hantzsch*, the stereoisomeric salts of diazosulphanilic acid, A., i, 373.
- Gerilowski, *Dimiter*. See also *Arthur Rudolf Hantzsch*.
- Gernez, *Désiré*, rotatory power of superfused rhamnose, A., ii, 287.
- Gernhardt, *Victor*. See *Ernst Beckmann*.
- Gerrard, *Alfred W.*, the cyano-cupric estimation of glucose, A., ii, 225.
- Giacomelli, *Leopoldo*, quantitative analysis of mixtures of sulphites, carbonates, and sulphates, A., ii, 124.
- qualitative separation of chromium from iron, A., ii, 128.
- Gies, *William J.* See *Russell H. Chittenden*.
- Giglio, *G.* See *Ubaldo Antony*.
- Gildemeister, *Eduard*, ethereal oils, A., i, 54.
- Gildemeister, *Eduard*. See also *Julius Bertram*.
- Gill, *Augustus H.* and *Samuel P. Hunt*, estimation of methane and hydrogen by explosion, A., ii, 341.
- Gill, *Augustus H.*, and *Herbert Appleton Richardson*, estimation of nitrites in potable waters, A., ii, 340.

- Gin, *Gustav*, oehres, A., ii, 479.
- Ginzberg, *Alexander*, sobrerol (Δ -menthene-2:8-diol), A., i, 446.
- dehydration of menthane-1:2:8-triol, A., i, 447.
- Ginzberg, *Alexander*. See also *Georg Wagner*.
- Girard, *Otto*. See *Heinrich Goldschmidt*.
- Girardet, *F.* See *Maurice Meslans*.
- Giustiniani, *Ercole*, constituents of nettles, A., ii, 495.
- Gladding, *Thomas S.*, gravimetric method of estimating phosphoric acid as ammonium phosphomolybdate, A., ii, 336.
- estimation of sulphur in pyrites, A., ii, 622.
- Glaserapp, *Maximilian*, estimation of fusel oil in rectified spirit by Röse's process, A., ii, 277.
- Gley, *Eugène*. See *Emile Elié Bourquelot*.
- Glinka, *Sergei F.*, chemical composition and optical properties of Russian albite, A., ii, 567.
- Glogauer, *R.*, orthophthalaldehydic acid and aromatic bases, A., i, 683.
- Glücksmann, *Carl*, resolution of benzaldehydecyanhydrin by means of alkalis, A., i, 39.
- formation of pinaeolin from calcium isobutyrate, A., i, 333.
- Gnehm, *Robert*, and *E. Bänziger*, products of the chlorination of benzaldehyde and their derivatives, A., i, 432.
- Gnehm, *Robert*, and *Louis Benda*, action of diazo-compounds on tartrazin, A., i, 678.
- Godeffroy, *Richard*, pyrogallol, A., i, 357.
- Godlewski, *Emil*, nitrification, A., ii, 668.
- Göhlich, *Wilhelm*, water of crystallisation of morphine hydrochloride and of morphine, A., i, 191.
- Göldner, *M.*, gelseminine, A., i, 657.
- Göttig, *Christian*, behaviour of aluminium with ammonium compounds: method of producing chemical change on the surface of commercial aluminium, A., ii, 524.
- Goetze, *K.*, and *Theodor Pfeiffer*, formation and behaviour of the pentoses in plants and animals, A., ii, 443.
- Goldhammer, *Dmitri A.*, analytical representation of the periodic system of the elements, A., ii, 471.
- Goldschmidt, *Carl*, a synthesis of 3:5-methylphenylpyrazole, A., i, 189.
- Goldschmidt, *Carl*, diphenylisoxazole, A., i, 189.
- action of ammonia on ethylic benzoylacetate, A., i, 231.
- action of formaldehyde on phenylhydrazine in acid solution, A., i, 543.
- action of formaldehyde on *as*-phenylmethylhydrazine in acid solution, A., i, 543.
- Goldschmidt, *Heinrich*, etherification by means of alcoholic hydrogen chloride, A., i, 229.
- etherification, A., ii, 638.
- Goldschmidt, *Heinrich*, and *Otto Girard*, cryoscopic experiments with salts of phenols, A., i, 474.
- Goldschmidt, *Heinrich*, and *R. U. Reinders*, reaction velocity in the conversion of diazoamido- into amido-azo-derivatives, A., ii, 515, 556.
- Goldschmiedt, *Guido*, and *Franz Schranzhofer*, hydrazones of fluoronone and its derivatives, A., i, 174.
- Goldsmith, *Edward*, kauaiite, a new mineral from Hawaii, A., ii, 35.
- pimelite and asbeferrite, A., ii, 36.
- tempered steel meteorite, A., ii, 41.
- Goldstein, *I.*, reaction of aromatic bases with ethylic benzylidenemalonate and furfurylidenemalonate, A., i, 435.
- Gonnermann, *Max*, a diastatic ferment in the sugar beet, A., ii, 381.
- Gooch, *Frank Austin*, and *P. S. Evans*, reduction of selenic acid by hydrochloric acid, A., ii, 125.
- Gooch, *Frank Austin*, and *A. W. Peirce*, estimation of selenious and selenic acids, A., ii, 334.
- Gooch, *Frank Austin*, and *W. G. Reynolds*, reduction of selenious and selenic acids by hydriodic acid, A., ii, 124.
- Gooch, *Frank Austin* and *W. S. Scoville*, reduction of selenic acid by potassium bromide in acid solution, A., ii, 125.
- Goodwin, *William*. See *William Henry Perkin, jun.*
- Goodwin, *William L.*, nickeliferous pyrites, A., ii, 109.
- Gordon, *Victor*, absorption of nitrous oxide in water and in salt solutions, A., ii, 154.
- Gorges, source of error as to the presence and estimation of boric acid, A., ii, 575.
- Gorgeu, *Alexandre*, artificial gypsum, A., ii, 35.
- Gorski, *Th. von*, derivatives of formylcarbamide, A., i, 667.
- Gorter, *K.*, Van de Moer's reaction

- and the detection of cystiscine, A., ii, 344.
- Coske, Adolf**, lard analysis, A., ii, 82.
- Gottlieb, Rudolf**, action of mustard and pepper on digestion, A., ii, 42.
- Goudet, Charles**. See *Philippe A. Guye*.
- Goulding, Ernest**. See *Wyndham Rowland Dunstan*.
- Gourfein, D.**, toxic substance from the supra-renal capsules, A., ii, 49.
- Gouy, A.**, electrocapillary properties of dilute sulphuric acid, A., ii, 143.
- Goyder, George A.**, chemistry of the cyanide process for the extraction of gold from its ores, A., ii, 28, 565.
- Graebe, Carl**, synthesis of chryso-ketone (naphthfluorenone) and the constitution of chrysene, A., i, 443.
- Graebe, Carl**, and *Fr. Bossel*, dicarboxyphenylglyoxylic acid, A., i, 436.
- Graebe, Carl**, and *J. Jequier*, acenaphthene [acenaphthylene] glycol, A., i, 444.
- — acenaphthenone, A., i, 444.
- Graebe, Carl**, and *Max Leonhardt*, hemimellitic acid, A., i, 437.
- Graebe, Carl**, and *B. von Mantz*, action of bromine, chlorine, and sulphur on fluorene, A., i, 442.
- Graebe, Carl**, and *H. Stindt*, bidiphenylenethylene and bidiphenylene-ethane, A., i, 565.
- Graebe, Carl**, and *F. Ullmann*, new method of preparing orthohydroxybenzophenone, A., i, 440.
- — orthamidobenzophenone, A., i, 556.
- — synthesis of carbazole, A., i, 575.
- — formation of diphenylene oxide from phenylic ether, A., i, 619.
- Graham, Edward**. See *Harold Baily Dixon*.
- Gramont, Arnaud de**, spectrum of phosphorus in fused salts and certain metallurgical products, A., ii, 585.
- dissociation spectra of fused salts of alkali metals, A., ii, 585.
- Grande, Ernesto**, ethers of phenolphthaleïn, A., i, 563.
- Grandeau, L.**, sulla (*Heydoarum coranarium*), A., ii, 268.
- application of phosphates and superphosphates to acid soils, A., ii, 269.
- Granger, A.**, tin thiophosphide, A., ii, 365.
- crystallised iron sesquiphosphide, A., ii, 476.
- action of phosphorus on metallic chlorides, A., ii, 602.
- Granger, A.**, action of halogen compounds of phosphorus on iron, nickel, and cobalt, A., ii, 650.
- Green, Joseph Reynolds**, effect of light on diastase, A., i, 110.
- Gregor, Georg**, resacetophenone, A., i, 43.
- action of ethylic iodide on potassium β -resorcyate, A., i, 171.
- constitution of ethyl- β -resorcylic acid, A., i, 616.
- Gréhan, Nestor**, poisonous effects of acetylene, A., ii, 200.
- estimation of ethylic alcohol in the blood after introduction of the liquid into the veins, or of the vapour into lungs, A., ii, 664.
- Grell, Fritz**, dinitrobenzoic acids, A., i, 95.
- Griffiths, Arthur Bower**, red pigment of *Amanita muscaria*, A., i, 653.
- Griffiths, Arthur Bower**, and *C. Platt*, pelageïne, A., i, 182.
- Griffiths, Ernest Howard**, thermal unit, A., ii, 147.
- Griffiths, Ernest Howard**, and *Dorothy Marshall*, latent heat of evaporation of benzene, A., ii, 349.
- Grimaldi, Siro**, salts of phenylhydrazine and of α -methylphenylhydrazine, A., i, 220.
- Grimaux, C.**, 3-ethoxyquinoline, A., i, 255.
- Grimbert, Léon**, action of Friedländer's *Pneumococcus* on sugars, A., ii, 322.
- Grindley, Harry Sands**. See *Charles Loring Jackson*.
- Gröger, Max**, apparatus for quantitative electrolysis, A., ii, 272.
- Gross, Theodor**, new electrolytic method, A., ii, 472.
- experiments with silver sulphide, A., ii, 521.
- Grosse, S.** See *Paul Ehrhardt Janasch*.
- Grosvenor, William M., jun.**, new solvents for perchromic acid, A., ii, 177.
- Groth, Paul Heinrich**, molecular symmetry and asymmetry, A., ii, 159.
- Grueber, von**, analysis of artificial manures, A., ii, 74.
- Grüss, J.**, the function of diastase in plants, A., ii, 59.
- digestion of cellulose by enzymes, A., ii, 669.
- Grützner, Bruno**, and *M. Höhnel*, metaplumbates of the alkaline earths, A., ii, 248.
- Gümbel, C. Wilhelm von**. See *Adolph Schwager*.

Severata
p. 1053

- Günthert, *C. von*. See *Carl Hell*.
 Guerbet, campholie acid, A., i, 56.
 Guerbet and *Auguste Béhal*, constitution of inactive campholene acid, A., i, 652.
 Guericke, *Richard*. See *Otto Wallach*.
 Guglielmo, *Giovanni*, modification of Mohr's balance, and a simple apparatus for measuring volumes of solids, A., ii, 244.
 Guichard, *M.*, molybdenite and the preparation of molybdenum, A., ii, 563.
 Guillot. See *Gustave Massol*.
 Guinchant, *J.*, derivatives of alkylic cyanacetates, A., i, 594.
 — heats of combustion of some β -ketonic ethereal salts, A., ii, 12.
 — heats of combustion of cyanogen derivatives, A., ii, 465.
 Gundlich, *Ch.*, and *Emil Knoevenagel*, derivatives of chlorodihydrobenzene, A., i, 212.
 Gunnell, *Oswald*. See *Arthur George Perkin*.
 Gunning, *Jan Willam*, estimation of water in raw sugars, A., ii, 453.
 Guntz, *Antoine*, lithium subchloride, A., ii, 299.
 — lithium hydride, A., ii, 359.
 — properties of metals separated from their amalgams, A., ii, 421.
 Gurgenzanz, *G.*, and *Stanislaus von Kostanecki*, reduction products of xanthone, A., i, 52.
 Gustavson, *Gabriel*, vinyltrimethylene, A., i, 669.
 — ethyridenetrimethylene, A., i, 669.
 Guye, *Philippe A.*, and *C. Goudet*, new examples of the superposing of the optical effects of two asymmetric carbon atoms, A., ii, 134.
 — — optical superposition of six asymmetric carbon atoms in the same active molecule, A., ii, 458.
 Guye, *Philippe A.*, and *Charles Jordan*, rotatory dispersion of non-polymerised active liquids, A., ii, 459.
 Guye, *Philippe A.*, and *B. Rossi*, dissociation of optically active salts in solution, A., ii, 85.
- H.**
- Haarst, *J. van*. See *Otto Pitsch*.
 Haas, *B.*, estimation of tartar and tartaric acid in wines, A., ii, 583.
 Haas, *R. N. de*, partial oxidation of some secondary and tertiary amines, A., i, 122.
 Haas. See *Tromp de Haas*.
 Haddon, *E.* See *Paul Cazeneuve*.
 Haefcke, *H.* See *J. H. Vogel*.
 Haeussermann, *Carl*, and *Eugen Bauer*, derivatives of phenylic ether, A., i, 676.
 Haeussermann, *Carl*, and *Hermann Teichmann*, diamidobenzoic acids, A., i, 170.
 — derivatives of phenylic ether, A., i, 533.
 Haga, *Tamemasa*. See *Edward Divers*.
 Hagenbach, *August*, thermo-elements of amalgams and electrolytes, A., ii, 513.
 Hake, *H. Wilson*, preliminary note on the absorption of moisture by deliquescent salts, P., 1896, 33; discussion, *ibid.*, 35.
 Haldane, *John Scott*, action of carbonic oxide on man, A., ii, 52.
 — estimation of carbonic oxide in air, A., ii, 76.
 Hall, *William J.* See *Arthur Amos Noyes*.
 Haller, *Albin*, action of phenylic isocyanate on some acids and ethereal salts, A., i, 32.
 — campholide, a product of reduction of camphoric anhydride, A., i, 385.
 — conversion of dextrocamphoric acid into dextrocamphor, A., i, 448.
 — extraction of terpenic alcohols from essential oils, A., i, 490.
 Haller, *Albin*, and *Jules Minguin*, camphoric mononitrile: its anhydride and anilide, A., i, 695.
 Hallervorden, *Eugen*, excretion of ammonia in disease, A., ii, 379.
 Halliburton, *William Dobinson*, and *T. Gregor Brodie*, action of pancreatic juice on milk, A., ii, 662.
 Hallopeau, *L. A.*, zirconotungstic compounds, A., ii, 607.
 — action of ammonia on alkali paratungstates, A., ii, 652.
 Halphen, *Georges*, detection of vegetable or animal oil in mineral oil, A., ii, 399.
 Hamberg, *Axel*, inosite from Jakobsberg, Sweden, A., ii, 308.
 — etching of calcite, A., ii, 366.
 Hambly, *Frederick John*. See *Edward Waymouth Reid*.
 Hamburger, *Friedrich*, colour change of dilute solutions of potassium chromoxalate, A., ii, 86.
 Hamburger, *Hartog Jakob*, physical factors in absorption, A., ii, 50.
 — estimation of added water in milk by taking its freezing point, A., ii, 550.

- Hammarsten, Olof**, behaviour of paracasein with rennet, A., i, 583.
- Hammond, P. T.**, a supposed sulphocarbonate of lead, A., ii, 256.
- Hamonet, Jules**, electrolysis of acids of the acetic series, A., i, 664.
- Hanamann, Joseph**, Moldavite from Bohemia, A., ii, 434.
- Hankel, M.** See *Leopold Rügheimer*.
- Hanriot, Maurice**, chloraloses, A., i, 519.
- Hantzsch, Arthur Rudolf**, diazoperhaloids, A., i, 92.
- synthesis and constitution of benzene, A., i, 419.
- diazonium, A., i, 429.
- dinitrosulphonic acid (nitroxysulphurous acid), A., ii, 96.
- hyponitrous acid, A., ii, 520.
- Hantzsch, Arthur Rudolf**, and *William B. Davidson*, diazophenols, A., i, 540.
- Hantzsch, Arthur Rudolf**, and *Hans Freese*, thiodiazo-derivatives, A., i, 217.
- Hantzsch, Arthur Rudolf**, and *Dimiter Gerilowski*, normal diazo-metallic salts, A., i, 428.
- ionic dissociation of the diazosulphonates, A., i, 439.
- Hantzsch, Arthur Rudolf**, and *Benno Hirsch*, intramolecular rearrangement of diazonium thiocyanates, A., i, 428.
- Hantzsch, Arthur Rudolf**, and *Ludwig Mai*, imidocarbonates and the so-called normal ethereal cyanates, A., i, 33.
- Hantzsch, Arthur Rudolf**, and *W. T. Metcalf*, nitramineacetic acid, A., i, 521.
- Hantzsch, Arthur Rudolf**, and *Otto W. Schultze*, isomeric phenylnitromethane [*exo*-nitrotoluene], A., i, 353.
- isomerism of nitro compounds. II. A., i, 672.
- Hantzsch, Arthur Rudolf**, and *William Semple*, the so-called oxysulphazotic acid or nitrosodisulphonic acid, A., ii, 95.
- Hantzsch, Arthur Rudolf**, and *Wilhelm Wild*, oximes of α -halogenised aldehydes, ketones and acids: oximidoacetic acids, A., i, 285.
- Hantzsch, Arthur Rudolf**. See also *Dimiter Gerilowski*.
- Harcourt, Augustus George Vernon**, Presidential Address, T., 561; P., 1896, 80.
- Harcourt, Augustus George Vernon**, and *William Esson*, laws of connection between the conditions of a chemical change and its amount. III. Further researches on the reaction of hydrogen dioxide and hydrogen iodide, A., ii, 238.
- Hardy, W. B.**, and *Frank F. Wesbrook*, wandering cells of the alimentary canal, A., ii, 42.
- Hare, C. L.**, qualitative separation of the metals of the iron group, A., ii, 127.
- Harger, J.** See *Karl Auwers*.
- Harker, J. A.** See *Harold Baily Dixon*.
- Harley, Vaughan**, sugar as a food, A., ii, 44.
- Harley, Vaughan**. See also *F. Tangl*.
- Harries, Carl D.**, the oximes of the cyclic acetone bases: paramidotrimethylpiperidine, A., i, 317.
- Harries, Carl D.**, and *George J. Busse*, reduction of unsaturated aromatic ketones and their conversion into coumaran derivatives, A., i, 301.
- Harries, Carl D.**, and *G. Eschenbach*, reduction of unsaturated ketones, A., i, 305.
- 4 : 5-diphenyloctane-2 : 7-dione, A., i, 689.
- Harries, Carl D.**, and *George Loth*, constitution of 1-phenylpyrazolone, A., i, 321.
- Harrington, Bernard James**, composition of Canadian limestones and dolomites, A., ii, 116.
- Harrington, Bernhard James**. See also *Frank D. Adams*.
- Harris, Harry B.** See *Edgar F. Smith*.
- Hart, Edward**, purification of beryllium salts, A., ii, 168.
- Hart, E. B.** See *Edward D. Campbell*.
- Hartley, Walter Noel**, the determination of the composition of a "white sou" by a method of spectrographic analysis, T., 842; P., 1896, 98.
- on the temperature of certain flames, T., 844; P., 1896, 98.
- Hartmann, Gabriel**. See *Adolf Claus*.
- Hartmann, K. N.** See *Ira Remsen*.
- Hartmann, Paul**. See *Max Busch*.
- Haselhoff, Emil**, injurious action of cobalt and of barium on plants, A., ii, 267.
- Haselhoff, Emil**. See also *Franz Josef König*.
- Hatch, Frederick H.**, lower carboniferous volcanic rocks of East Lothian, A., ii, 116.
- Hattensaur, Georg**, estimation of arsenic in crude sulphuric acid, A., ii, 390.

- Haworth, Edward**, and **William Henry Perkin**, jun., note on the preparation of glycol, T., 175; P., 1896, 37.
- Haworth, Edward**. See also **William Henry Bentley**.
- Hayes-Campbell, J.** See **Allerton S. Cushmann**.
- Hazen, Allen**, estimation of the colours of natural waters, A., ii, 548.
- Heal, Carlton B.**, and **Henry Richardson Procter**, analysis of used liquors in chrome tannage, A., ii, 393.
- Heath, G. L.**, estimation of sulphur in refined copper, A., ii, 497.
- Heber, Eduard**. See **Paul Jacobson**.
- Heberdey, Ph.**, gehlenite and wollastonite in slags from Przibram, A., ii, 371.
- Heberlein, Georg**. See **Hans Rupe**.
- Hébert, Alexandre**, isanic acid, A., i, 638.
- saps, A., ii, 494.
- Hedin, Sven Gustaf**, formation of arginine from proteid substances, A., i, 193.
- decomposition products of proteids, A., i, 659.
- Hefelmann, Rudolf**, estimation of sugar by the copper method, A., ii, 505.
- Hefelmann, Rudolf**, and **Paul Mann**, detection of fluorine in beer, A., ii, 497.
- — simple process for testing linseed oil, boiled oil, and paints, A., ii, 680.
- Heffter, Arthur**, Cactus alkaloids, II, A., i, 267.
- Hehner, Otto**, detection of formalin, A., ii, 583.
- Heiber**, estimation of nitrogen in Peruvian guano, A., ii, 217.
- Heide, K. von der**, and **Karl A. Hofmann**, compounds of the lower oxides and sulphides of molybdenum with ammonia and with potassium cyanide, A., ii, 605.
- Heidenhain, Heinrich**, estimation of carbonic anhydride by absorption, A., ii, 337.
- Heidenreich, Karl**. See **Theodor Curtius**.
- Heidenreich, Max**, quantitative analysis by electrolysis, A., ii, 545.
- Heidenreich, O.** See **Paul Ehrhardt Jannasch**.
- Heilbrun, R. L.** See **Martin Freund**.
- Heiler, H.** See **Heinrich Beckurts**.
- Heilpern, Johann**, "carbothioacetone," A., i, 603.
- Heine, L.**, chemistry of Mitosis, A., ii, 489.
- Heine, L.**, molybdic acid as a microscopic reagent, A., ii, 536.
- Heinen, Fr.** See **Max Busch**.
- Heinke, John Leathart**, and **William Henry Perkin**, jun., action of ethylic β -iodopropionate on the sodium derivative of ethylic isopropylmalonate, T., 1506; P., 1896, 155.
- Heiselin, M.** See **Maximilien Rietsch**.
- Hell, Carl**, action of finely divided silver on halogen derivatives of aliphatic acids, A., i, 10.
- preparation of ketones from aromatic propenyl- ($-\text{CH}:\text{CHMe}$) derivatives, A., i, 169.
- Hell, Carl**, and **Carl Gaab**, derivatives of isanethoöl, A., i, 293.
- Hell, Carl**, and **O. von Günthert**, action of bromine on anethoöl, A., i, 20.
- Hell, Carl**, and **A. Hollenberg**, action of sodium ethoxide on anethoöl and bromanethoöl dibromides, A., i, 354.
- Hell, Carl**, and **B. Pörtmann**, action of sodium ethoxide on ethylisoeugenol dibromide, A., i, 357.
- Hell, Carl**, and **S. Weinzweig**, action of finely divided silver on ethylic phenylbromacetate, A., i, 45.
- Helle, Alfred**. See **Julius Brecht**.
- Helm, Otto**, gedanite, succinite, &c., A., i, 57.
- burmite, a new amber-like resin from Upper Burma, A., ii, 252.
- Helmert, Bruno**. See **Theodor Zincke**.
- Helmholtz, Hermann Ludwig Ferdinand von**, memorial lecture on, T., 885; P., 1896, 25.
- Hempel, Walther**, estimation of the heat of combustion of fuels, A., ii, 556.
- Hempel, Walther**, and **Hermann Thiele**, atomic weight of cobalt, A., ii, 302.
- Henderson, George Gerald**, and **John M. Barr**, the action of certain acidic oxides on salts of the hydroxy acids. III., T., 1451; P., 1896, 168.
- Henderson, James**, action of sugars on ammoniacal silver nitrate, T., 145; P., 1896, 9.
- Henderson, James**. See also **James Walker**.
- Henderson, J. M. C.** mica-seyenite from Rothschoenberg, Saxony, A., ii, 533.
- Henneberg, W.**, and **Bernhard Tollens**, action of formaldehyde and hydrochloric acid on tartaric acid, A., i, 645.
- — dimethylenegluconic acid, A., i, 645.
- — methylenesaccharic acid, A., i, 645.

- Henrich, Ferdinand.** See *Paul Jacobson*.
- Henrich, Fr.,** two modifications of mononitroso-oreinol [oximido-oreinol], A., i, 476.
- Henriet,** rapid estimation of carbonic anhydride in the atmosphere, &c., A., ii, 624.
- Henriques, Robert,** action of sulphur on unsaturated fatty compounds, A., i, 204.
- quantitative separation of benzene from light petroleum, A., ii, 77.
- saponification in the cold: saponification numbers and Reichert-Meissl numbers, A., ii, 281.
- Henry, Louis,** nitro-alcohols, A., i, 4.
- beryllium carbide, A., ii, 169.
- Henzold, Otto,** extracting fat from cheese for testing purposes, A., ii, 680.
- Hepp, Eduard.** See *Otto Fischer*.
- Herbig, Ad.** See *Otto Wallach*.
- Herborn, Heinrich.** See *Emil Fischer*.
- Herbrand, A.** See *Fritz Fichter*.
- Herfeldt, E.,** and *Albert Stutzer*, amount of fat, sugar, and tannin in coffee, A., ii, 63.
- Herfeldt, E.** See also *R. Burri*.
- Herfeldt, G.,** cyanalkines, cyanobenzylidine [4-amido-5-phenyl-2:6-dibenzylmetadiazine], A., i, 393.
- Heringa, J.** See *Eduard Mulder*.
- Hérissey, H.** See *Emile Elié Bourquelot*.
- Heron, John,** estimation of the extract of malt in the laboratory, A., ii, 343.
- polarisation and analysis of black beers, worts, and caramel, A., ii, 394.
- Herroun, Edward Felix,** an iodine voltameter for the measurement of small currents, A., ii, 7.
- Herschkowitsch, M.** See *Pavel Iw. Petrenko-Kritschenko*.
- Hertlein, Hans,** the polythionates, A., ii, 353.
- Herty, Charles H.,** mixed haloïd compounds of platinum and potassium, A., ii, 306.
- recent work on double haloïds, A., ii, 474.
- Hertz, M.** See *Friedrich Kehrman*.
- Herz, Walter,** salvadorite, a new copper iron sulphate, A., ii, 368.
- Herzig, Josef,** hæmatoxylin and brazilin. III., A., i, 379.
- isomeric acetylaurins, A., i, 486.
- luteolin, A., i, 494.
- Herzig, Josef,** and *Hans Meyer*, estimation of alkyl groups attached to nitrogen, A., i, 68.
- Herzig, Josef,** and *Hans Meyer*, phthaleins, A., i, 237, 238.
- Hess, Arnold,** camphoronic acid, A., i, 102.
- Hesse, Albert,** alleged identity of re-uniol, rhodinol, and geraniol, A., i, 382.
- Hesse, Oswald,** physeihydrone and protophyseihydrone, A., i, 60.
- phenyleoumalin and pseudodieo-toin, A., i, 60.
- triresoreinol, A., i, 152.
- root of *Aristolochia argentina*, A., i, 180.
- the root of *Rumex nepalensis*, A., i, 315, 573.
- sugar bush (*Protea mellifera*), A., i, 495.
- proteacin [leueodrin], A., i, 495.
- scopolamine and atroseine, A., i, 655.
- hyoscine, A., i, 656.
- bark and leaves of *Drimys granatensis*, L., A., ii, 62.
- testing quinine sulphate, A., ii, 550.
- Heuser, Carl.** See *Johannes Thiele*.
- Hewitt, John Theodore,** and *Frank G. Pope*, the condensation of chloral with resoreinol, T., 1265; P., 1896, 150.
- Hewitt, John Theodore,** and *Henry E. Stevenson*, the three chlorobenzene-azosalicylic acids, T., 1257; P., 1896, 149.
- Hewlett, Richard T.,** Ehrlich's diazo-reaction, A., ii, 284.
- Heyl, Georg,** and *Victor Meyer*, new treatment of the benzene problem: derivatives of thymotic acid, A., i, 145.
- Hibbs, Joseph G.** See *Edgar Francis Smith*.
- Hibsch, Josef Emanuel,** analysis of augite and nepheline-leucite-tephrite from Bohemia, A., ii, 117.
- [analysis of serieite, augite, and waters from Bohemia], A., ii, 534.
- Hicks, Edwin F.,** formation of citric acid by the oxidation of cane sugar, A., i, 136.
- Hiepe, William L.,** fractional fermentation of cane sugar with pure yeasts, A., ii, 320.
- Higley, George O.,** and *W. E. Davis*, action of metals on nitric acid, A., ii, 560.
- Higley, George O.,** and *B. J. Howard*, apparatus for electrolysis of hydrochloric acid, A., ii, 557.
- Hilger, Albert,** columbin and columbic acid, A., i, 623.
- Hilger, Albert,** and *Carl Mai*, action of halogens on the colouring matter

- of the kermes berry (*Phytolacca decandra* L.), A., i, 496.
- Hill, *Edwin A.*, argon, Prout's hypothesis, and the periodic law, A., ii, 16.
- argon and helium, A., ii, 418.
- Hill, *Henry Barker*, and *Joseph Torray*, formation of 1 : 3 : 5-trinitrobenzene and 1 : 4-nitrophenol from nitromalonic aldehyde, A., i, 90.
- Hillebrand, *William Francis*, calverite from Cripple Creek, Colorado, A., ii, 31.
- analysis of nickel iron sulphide, bauxite feldspars and piedmontite, A., ii, 39.
- widespread occurrence of barium and strontium in silicate rocks, A., ii, 191.
- analysis of water from Ojo Caliente, New Mexico, A., ii, 194.
- warning against the use of fluoriferous hydrogen peroxide in estimating titanium, A., ii, 222.
- Hills, *Richard C.*, the Costilla meteorite, A., ii, 614.
- Himmelschein, *A.* See *Oscar Hinsberg*.
- Hinds, *J. I. D.*, photometric method for the estimation of lime and sulphuric acid, A., ii, 574.
- Hinsberg, *Oscar*, and *A. Himmelschein*, benzenesulphinic acid as a reagent, A., i, 684.
- — hydroxy- and amido-derivatives of diphenylsulphone, A., i, 685.
- Hinsberg, *Oscar*, and *Fritz König*, preparation of orthophenylenediamine, A., i, 165.
- Hinsberg, *Oscar*, and *P. Koller*, action of aldehydes on aromatic orthodiamines. IV, A., i, 536.
- Hinsberg, *Oscar*, and *J. Pollak*, dichloroquinoxaline derivatives, A., i, 394.
- Hinsberg, *Oscar*, and *A. Strupler*, benzenesulphonamides and mixed secondary amines, A., i, 47.
- Hintz, *Ernst*. See *Carl Remigius Fresenius*.
- Hirsch, *Benno*. See *Arthur Rudolf Hantzsch*.
- Hirsch, *Friedrich*, ethylic quinate and its conversion into dihydroxyquinoline, A., i, 626.
- Hirsch, *Robert*, papaveraloxime, A., i, 191.
- Hirschbrunn, *Fritz*. See *Adolph Claus*.
- Hirschsohn, *Eduard*, testing ethereal oils, A., ii, 223.
- detection of fatty oils in copaiba balsam : a new test for gurjun balsam : detection of colophony in guaiacum resin and balsams of tolu and copaiba, A., ii, 508.
- Hirtz, *H.*, action of bromine on aromatic iodo-compounds, A., i, 531.
- Hitchcock, *Fanny R. M.*, tungstates and molybdates of the rare earths, A., ii, 526.
- Hjelt, *Edvard Immanuel*, hydrolysis of the alkyl substitution derivatives of ethylic malonate, A., i, 205, 508.
- ledum-camphor, A., i, 248.
- velocity of lactone formation in acids of the sugar group, A., i, 596.
- alkylated valerolactones, A., i, 598.
- two stereoisomeric methylcarboxylolactonic acids, A., i, 600.
- hydrolysis of ethereal salts of certain tribasic acids, A., i, 600.
- Hobbs, *William H.*, cerussite coated with galena : manganite and chloritoid from Michigan : apatite and hessonite in pegmatite, A., ii, 33.
- Hobohm, *Karl*. See *Daniel Vorländer*.
- Hodgkinson, *William Richard Eaton*, fluorene and acenaphthene, P., 1896, 110.
- Höhnel, *M.* See *Bruno Grützner*.
- Hof, *L.* See *Karl Auwers*.
- Hofer, *Hans*. See *Wilhelm von Miller*.
- Hoff, *Jacobus Henricus van't*, the dilution law of salts, A., ii, 145.
- Hoffmann, *G. Christian*, ilvaite, harmotome, opal, danaite, scheelite, chromiferous muscovite, gersdorffite, nickeliferous pyrrhotite from Canada, A., ii, 190.
- lepidomelane, actinolite, andradite, grossular, hornblende, chlinochlore, talc, diallage, damourite, serieite, cookeite, cobaltiferous lollingite, bismuthite, strontianite, and native iron from Canada, A., ii, 257.
- Hoffmeister, *Wilhelm*, citrate solubility of the phosphoric acid of basic slag, A., ii, 214.
- Hofman, *J. J.*, estimation of sodium salicylate in presence of "ichthyol," A., ii, 549.
- Hofmann, *Adolf*, witherite from Příbram, A., ii, 610.
- Hofmann, *August Wilhelm von*, memorial lectures on, T., 575, P., 1893, 133.
- Hofmann, *Karl A.*, explosive double salt of potassium cyanide and potassium nitrite, A., i, 69.
- sodium nitroferrocyanides, A., 69, 197, 517.
- sodium nitrosoferrocyanide, A., i, 269.

- Hofmann, Karl A.**, a new perthio-molybdic acid, A., ii, 476.
- Hofmann, Karl A.**, and **O. Fritz Wiede**, phenylic ethers of nitroso-compounds of iron, A., i, 291.
- Hofmann, Karl A.** See also **K. von der Heide**, **Oskar Unger**.
- Hofmann, T. S.** See **Theodor Curtius**.
- Hohenadel, Max**, sagapen, A., i, 58.
- Hoitsema, C.**, equilibrium in the system $\text{HgO}-\text{SO}_3-\text{H}_2\text{O}$, A., ii, 15.
- the end-point in Gay-Lussac's method of silver titration, A., ii, 624.
- Holborn, L.**, and **Wilhelm Wien**, measurement of high temperatures, A., ii, 87.
- Holdefleiss, P.**, importance of digested crude fibre as food, A., ii, 616.
- Holland, Philip**, and **Edmund Dickson**, alteration of diabase and granite: formation of clay, A., 261.
- Holland, Thomas H.**, magnetite from the Madras Presidency containing manganese and aluminium, A., ii, 254.
- lislopite, A., ii, 261.
- Holleman, Arnold Frederik**, phenyl-nitromethane (exonitrotoluene), A., i, 148.
- Hollenberg, A.** See **Carl Hell**.
- Holmquist, P. J.**, knopite, a new perovskite, from Alnö, Sweden, A., ii, 313.
- Holst, Nils Olof**, beaumontite from Sweden, A., ii, 312.
- Honde, Seiroku.** See **Oscar Loew**.
- Hoogewerff, Sebastiaan** and **Willem Arne van Dorp**, derivatives of camphoric and hemipinic acids, A., i, 313.
- Hooker, Samuel C.**, the constitution of lapachol and its derivatives. Part III. The structures of the amylene chain, T., 1355; P., 1896, 166.
- lomatiol (hydroxyisolapachol), T., 1381; P., 1896, 166.
- Hopkins, Arthur John.** See **Harmon Northrup Morse**.
- Hopkins, Cyril G.**, new safety distillation tube for nitrogen estimations, A., ii, 543.
- Hopkins, F. Gowland**, pigments of the pieridæ, A., ii, 198.
- Hopkins, F. Gowland.** See also **Archibald Edward Garrod**.
- Hoppe-Seyler, Georg, F.** Hoppe-Seyler's double colorimetric pipette, A., ii, 552.
- Horne, John.** See **J. J. Harris Teall**.
- Horne, R. M.**, coagulation of blood, A., ii, 437.
- Hoskins, A. Percy**, glauconite from co. Antrim, A., ii, 434.
- Howard, B. J.** See **George O. Higley**.
- Howe, W. T. H.**, two ortho-phthalic acids, A., i, 480.
- Howell, Edwin E.**, the Cherokee and El Capitan meteorites, A., ii, 193.
- Howells, V. A.** See **William Ridgely Orndorff**.
- Howitz, Hans.** See **Adolph Claus**, and **Amé Pictet**.
- Hubert, A.** See **G. Nivière**.
- Hüfner, Carl Gustav**, solubility of carbonic oxide in solutions of hæmoglobin: dissociation of carbonic oxide hæmoglobin, A., ii, 485.
- Hürthle, Karl**, compounds of fatty acids and cholesterol in blood-serum, A., ii, 485.
- Hughes, John**, estimation of water in commercial ammonium sulphate, A., ii, 70.
- Hugot, C.**, some alkali phosphides, A., ii, 21.
- Huizinga, D.**, preparation of glycogen, A., i, 6.
- Hulsebosch.** See **Ledden-Hulsebosch**.
- Hummel, John James.** See **Arthur George Perkin**.
- Humphreys, W. J.**, solution and diffusion of certain metals in mercury, T., 243, 1679; P., 1896, 9, 220.
- Hunt, Samuel P.** See **Augustus H. Gill**.
- Huntington, Oliver Whipple**, the Smithville meteoric iron, ii, 484.
- Hurlburt, E. B.** See **Horace Lemuel Wells**.
- Husmann, August.** See **Wilhelm Koenigs**.
- Hutchinson, Arthur** and **W. Pollard**, lead tetracetate and the plumbic salts, T., 212; P., 1896, 30.
- Huth, M.** See **Adolph Claus**.
- Huth, P.** See **Hugo Erdmann**.
- Hyndman, Hugh H. F.**, and **Thomas George Bonney**, analyses of spherulites and matrix of rocks, A., ii, 614.

I.

Ide. See **Balke**.

Igelström, Lars Johan, plumboferrite from the Sjö Mine, Sweden, A., ii, 307.

— rhodophosphite and tetragophosphite, two new minerals from Horrsjöberg, Wermland, A., ii, 308.

Ihle, Rudolf, catalytic action of nitrous acid and the potential of nitric acid, A., ii, 460.

— formation of ammonia by the electrolysis of nitric acid, A., ii, 464.

- Ihle, *Rudolf*, action of nitrous acid in a Grove's element, A., ii, 554.
 Ilinski, *Michael von*, detection of cobalt by nitroso- β -naphthol, A., ii, 451.
 Ingle, *Harry*. See *Johannes Thiele*.
 Innes, *W. R.* See *Karl Auwers*.
 Inouye, *M.*, preparation and composition of tofu, A., ii, 65.
 Ipatieff, *Wladimir*, action of hydrogen bromide on hydrocarbons of the series C_nH_{2n-2} , A., i, 330.
 — action of bromine on tertiary alcohols of the series $C_nH_{2n+2}O$, A., i, 401.
 Ippen, *J. A.*, artificial cinnabar, A., ii, 108.
 — dolomite from Graz, A., ii, 483.
 Isaieff, *W.* See *Nicolai D. Zelinsky*.
 Itallie, *Leopold van*, metallic double salts of antipyrine [dimethylphenylpyrazolone], A., i, 260.
 — iodine number of lard, A., ii, 344.
 Ittner, *M. H.* See *Charles Loring Jackson*.

J.

- Jackson, *Charles Loring*, and *Sidney Calvert*, stability of halogen derivatives of benzene, A., i, 473.
 — bromine derivatives of metaphenylenediamine, A., i, 538.
 Jackson, *Charles Loring*, and *Arthur Messinger Comey*, action of nitric acid on potassium cobalticyanide, A., i, 402.
 Jackson, *Charles Loring*, and *F. L. Dunlap*, bromine derivatives of resorcinol, A., i, 354.
 Jackson, *Charles Loring*, and *F. B. Gallivan*, derivatives of unsymmetrical tribromobenzene, A., i, 352.
 Jackson, *Charles Loring*, and *Harry Sands Grindley*, action of sodium alkyl oxides on chloranil; acetals derived from substituted quinones, A., i, 19, 154.
 Jackson, *Charles Loring*, and *M. H. Ittner*, 4-bromo-3 : 5-dinitrotoluene and its derivatives, A., i, 214.
 Jackson, *Charles Loring*, and *George Oenslager*, constitution of phenoquinone, A., i, 293.
 Jackson, *Charles Loring*, and *J. I. Phinney*, ethylic 2 : 4 : 6-trinitrophenylmalonate, A., i, 234.
 Jackson, *Charles Loring*, and *C. A. Soch*, ethylic 2 : 4 : 6-trinitrophenylmalonate, A., i, 370.
 Jackson, *Charles Loring*, and *William Homer Warren*, turmerole, A., i, 387.
 Jackson, *David Hamilton*. See *Wyndham Rowland Dunstan*.
 Jackson, *Herbert*, note on the use of certain phosphorescent substances in rendering X-rays visible; P., 1896, 57; discussion, *ibid.*, 60.
 Jacobson, *Paul*, behaviour of ethers of azophenol on reduction with stannous chloride and hydrochloric acid, A., i, 23.
 Jacobson, *Paul, Fr. Düsterbehn, J. Klein*, and *Grigori Schkolnik*, reduction of ethers of tolueneazophenols, A., i, 24.
 Jacobson, *Paul* (and in part *O. Fabian, W. Lischke, K. Michaelis*, and *A. W. Nanninga*), reduction products of azo-compounds, A., i, 96.
 Jacobson, *Paul, F. K. Fertsch, Fred Marsden*, and *Grigori Schkolnik*, reduction of benzeneazo-orthocresotöl and benzeneazometacresetöl, A., i, 23.
 Jacobson, *Paul, Eduard Heber, Ferdinand Henrich*, and *Carl Schwarz*, reduction of tolueneazocresetöils, A., i, 25.
 Jacobson, *Paul*, and *Friedrich Meyer*, reduction of azophenotöils, A., i, 27.
 Jacobson, *Paul*, and *Grigori Schkolnik*, reduction of metaxylencphenetöl, A., i, 27.
 Jänicke *H.* See *Carl Paal*.
 Jahn, *Hans*, loss of energy of a battery during electrolysis, A., ii, 230.
 Jahns, *Ernst*, occurrence of stachydrine in the leaves of *Citrus vulgaris*, A., i, 712.
 Jakowkin, *Alexander A.*, partition of a substance between two solvents, A., ii, 295.
 — dissociation of halogen salts, A., ii, 514.
 — relation between osmotic pressure and the law of active molecules, A., ii, 593.
 Jalowetz, *Eduard*, isomaltose, A., i, 405.
 — estimation of cane-sugar in malt, A., ii, 225.
 Jannasch, *Paul Ehrhardt*, note [synthesis of aromatic hydrocarbons], A., i, 147.
 — decomposition of silicates by boric acid, A., ii, 219.
 — delicate form of the mercury iodide reaction, A., ii, 545.
 — separation of manganese from copper and zinc, and of copper from zinc and nickel, A., ii, 546.

- Jannasch, Paul Ehrhardt**, [andalusite or dumortierite in Argentine granite], A., ii, 568.
- new method of converting sulphates into chlorides, A., ii, 574.
- behaviour of minerals of the andalusite group towards decomposing agents, A., ii, 576.
- separation of mercury from arsenic, antimony, and copper by ignition in a current of oxygen, A., ii, 675.
- Jannasch, Paul Ehrhardt**, and **E. von Cloedt**, separation of manganese from zinc in ammoniacal solution by means of hydrogen peroxide under pressure, A., ii, 220.
- separation of chromium from manganese, iron, and aluminium, A., ii, 222.
- Jannasch, Paul Ehrhardt**, and **S. Grosse**, separation of bismuth from the metals of the copper and iron groups by heating their salts in a current of dry hydrogen chloride, A., ii, 677.
- Jannasch, Paul Ehrhardt**, and **O. Heidenreich**, decomposition of silicates by boric acid, A., ii, 576.
- estimation of sulphur in inorganic sulphides. VI, A., ii, 671.
- Jannasch, Paul Ehrhardt**, and **H. Kammerer**, separation of arsenic from iron and manganese, A., ii, 221.
- Jannasch, Paul Ehrhardt**, and **H. Lehnert**, estimation of sulphur in inorganic sulphides, A., ii, 542.
- separation of mercury from other metals by heating the sulphides in a current of oxygen, A., ii, 546.
- separation of metals in alkaline solution by means of hydrogen peroxide. XV, A., ii, 547.
- Jannasch, Paul Ehrhardt**, and **P. Weingarten**, chemical composition and constitution of vesuvian [idocrase] and wiluite, A., ii, 259.
- — estimation of water in silicates, A., ii, 272.
- Japp, Francis Robert**, and **G. Druce Lander**, condensation of benzil with ethylic acetoacetate, T., 736; P., 1895, 146.
- — synthesis of pentacarbon rings. Part I. Anhydraectonebenzil and its homologues, P., 1896, 108.
- — reduction of desyleneacetic acid, and the constitution of Zinin's pyroamaric acid, P., 1896, 109.
- — synthesis of pentacarbon rings. Part II. Condensation of benzil with acetonedicarboxylic acid, P., 1896, 109.
- Japp, Francis Robert**, and **Thomas Smith Murray**, synthesis of pentacarbon rings. Part III. Condensation of benzil with levulic acid, P., 1896, 146.
- Jaquet, John Blockley**, serpentine after amphibole, A., ii, 534.
- Jaubert, George F.**, safranines, A., i, 325.
- nomenclature of phenazine dyes, A., i, 325.
- Jaworowski**, test for cinchona alkaloids, A., ii, 629.
- Jay, Henry**, distribution of boric acid in plants, A., ii, 327.
- volatile acids of wines, A., ii, 397.
- Jay, Henry**, and **Dupasquier**, estimation of boric acid, A., ii, 76.
- Jean, Ferdinand**, preparation of ethylamine from aldehyde-ammonia, A., i, 77.
- analysis of lard and similar fats, A., ii, 455.
- Jeiteles, Berthold**, distillation of orthocresol with lead oxide, A., i, 420.
- dry distillation of calcium phenylsalicylate [orthophenoxybenzoate], A., i, 434.
- Jenkins, Edward H.** See *Samuel William Johnson*.
- Jentys, Stef.**, decomposition and assimilation of the nitrogen compounds of stable manure, A., ii, 619.
- Jequier, J.** See *Carl Graebe*.
- Jerdan, David Smiles.** See *William Arthur Bone*.
- Jereméeff, Pavel V. von**, pseudomorphs of copper oxides and sulphides, A., ii, 566.
- Jewett, Frank F.**, arrangement for washing precipitates with boiling water, A., ii, 123.
- Jezioranski, L.** See *Carl Engler*.
- Jørgensen, Gunner**, volumetric estimation of boric acid, A., ii, 449.
- Jørgensen, Sofus Mads**, constitution of cobalt, chromium, and rhodium bases, A., ii, 424.
- John, Conrad Heinrich von**, and **C. F. Eichleiter**, analyses of Austrian minerals, &c., A., ii, 252.
- Johnson, (Sir) George**, the absence of sugar from normal urine proved by a new method, A., ii, 199.
- Johnson, Samuel William**, and **Edward H. Jenkins**, methods of determining the availability of organic nitrogen in fertilisers, A., ii, 620.
- Jolles, Adolf**, urobilin, A., ii, 51.
- detection and estimation of mercury in urine, A., ii, 77.
- a delicate test for albumin in urine, A., ii, 344.

- Jones, A. Wentworth**, molecular volume change during the formation of dilute solutions in organic liquids, P., 1895, 179.
- Jones, Harry Clary**, cryoscopic relations of dilute solutions of cane sugar and ethylic alcohol, A., ii, 155.
- Jones, Harry Clary**, and **Charles R. Allen**, conductivity of yttrium sulphate, A., ii, 462.
- — conductivity of solutions of acetylene in water, A., ii, 462.
- — use of phenolphthaleïn in illustrating the dissociating action of water, A., ii, 467.
- Jones, L. W.** See **Ulric Nef**.
- Jones, Walter**, sulphonephthaleïns from orthosulphoparatoluic acid, A., i, 49.
- Jordan, Charles.** See **Philippe A. Guye**.
- Jorissen, W. P.**, reaction of triethylphosphine with oxygen, A., i, 589.
- Jovitschitsch, Milorad**, action of hydroxylamine hydrochloride on isonitrosoacetone, A., i, 79.
- action of hydroxylamine hydrochloride on ethylic isonitrosoacetate, A., i, 81.
- preparation of ethylic isonitrosoacetate and of an isomeride from ethylic acetoacetate, A., i, 82.
- Jowett, Hooper Albert Dickinson**, contributions to our knowledge of the aconite alkaloids. Part XIII. On atisine, the alkaloid of *Aconitum heterophyllum*, T., 1518, P., 1896, 158.
- Judd, John Wesley.** See **C. Barrington Brown**.
- Jünger, Ernst**, and **A. Klages**, lithofellic acid, A., i, 194.
- — menthol, A., i, 244.
- — halogen derivatives of camphene and hydrocamphene, A., i, 313.
- Just, Alexander**, action of alcoholic potash on a mixture of formaldehyde and isobutaldehyde, A., i, 403.
- Jutt, Joan**, compounds of the colouring matter of the blood with heavy metals, i, 584.

K.

- Kahlbaum, Georg W. A.**, normal boiling tube, A., ii, 233.
- the so-called Liebig's condenser, A., ii, 244.
- Kahlenberg, Louis**, complex tartrates and alkaline solutions of copper and lead, A., ii, 6.
- Kaiser, Erich.** See **Ernst Adolph Hugo Laspeyres**.
- Kaltwasser, O.**, tetramethylene-1 : 3-dioxalylic acid, A., i, 670.
- Kammerer, H.** See **Paul Ehrhardt Jannasch**.
- Kaschau, A.** See **Friedrich Krafft**.
- Kassner, Georg**, orthoplumbates of the alkaline earths, A., ii, 247.
- Kastle, J. H.**, halogen derivatives of the sulphonamides, A., i, 172.
- new reagent for bromine and iodine, A., ii, 216.
- Kastle, J. H.**, and **J. H. Bullock**, preparation of hydrogen bromide and hydrogen iodide, A., ii, 356.
- Kastle, J. H.**, **B. C. Keiser**, and **Ernest Bradley**, halogen derivatives of the sulphonamides, A., i, 555.
- Katz, Alexander**, iodine numbers of pure and boiled linseed oil, A., ii, 680.
- Katz, Julius**, mineral constituents of flesh, A., ii, 377.
- Katzer, Friedrich**, opal, andalusite, tourmaline, sillimanite, cordierite, pinguite, and hoeferite from Bohemia, A., ii, 187.
- Kaufmann, H.**, electrolytic reduction of benzaldehyde, A., i, 649.
- Kaufmann, Hugo.** See **Frédéric Reverdin**.
- Kaufmann, Maurice**, formation of glycogen in the animal organism, A., ii, 119.
- estimation of urine in blood and tissues, A., ii, 130.
- Kaufmann, Victor**, diphenyldiphenylene-ethylene, A., i, 242.
- Kayser, Heinrich**, blue spectrum of argon, A., ii, 2.
- helium and argon, A., ii, 19.
- Kebler, Lyman F.**, estimation of morphine in opium, A., ii, 403.
- acidimetric estimation of vegetable alkaloids: a study of indicators, A., ii, 551.
- Kehrmann, Friedrich**, and **Hans Bürgin**, constitution of fluorindines, A., i, 512.
- — synthesis of aposafranone (benzencindone), A., i, 629.
- — an azonium compound isomeric with diphenylfluorindine dihydrochloride, A., i, 631.
- — synthesis of dioxyazine derivatives, A., i, 707.
- Kehrmann, Friedrich**, [and in part **Hermann Fühner**, **M. Hertz**, and **M. Tikhvinsky**], relationships of indulines to safranines, A., i, 508.

- Kehrmann, Friedrich**, and **M. Hertz**, influence of substituents on the formation of quinoneoximes A., i, 566.
- Kehrmann, Friedrich**, and **E. Locher**, azonium compounds from β -naphthaquinonesulphonic acid and phenyl-orthophenylenediamine, A., i, 700.
- Keiser, B. C.** See **J. H. Kastle**.
- Keiser, Edward Harrison**, preparation of allylene [methylacetylene], A., i, 457.
- Kellas, Alexander**, percentage of argon in atmospheric and respired air, A., ii, 661.
- Kellas, Alexander**, and **William Ramsay**, examination of gases from certain mineral waters, A., ii, 655.
- Keller, C. C.**, reactions of digitalin, A., ii, 683.
- Keller, Harry Frederick**, and **Maas**, estimation of sulphur in roasted copper ores and cupriforous pyrites, A., ii, 493.
- Kellner, Carl**, absorption of acid and alkali from solutions by platinum black, A., ii, 232.
- Kellner, Oscar**, **A. Köhler**, and **F. Barnstein**, examination of foods from farms where cattle suffered from brittleness of the bones, A., ii, 46.
- Kelvin, William Thomson (Lord)**, congratulatory address to, P., 1896, 121.
- Kenrick, Frank B.**, the potential difference between gases and liquids, A., ii, 460.
- Kerp, Wilhelm**, diphenylene ketone and pseudodiphenylene ketone, A., i, 238.
- camphorone, isophorone and mesityl oxide, A., i, 447.
- Kerr, G. M.** See **Otto Wallach**.
- Kerschbaum, M.**, synthetical use of iodine chloride, A., i, 162.
- Kerstiens, C.** See **Ludwig Claisen**.
- Kesselkaul, Ludwig**, and **Stanislaus von Kostanecki**, action of benzaldehyde on chloracetopyrogallol, A., i, 606.
- Kestner**. See **Scheurer-Kestner**.
- Kielbasinski, W. H.** See **Paul Friedländer**.
- Kiermayer, Joseph**, a derivative of furfuraldehyde from levulose, A., i, 144.
- Kijner, Nic.**, action of silver oxide on dibromomenthylamine: menthylhydrazine, A., i, 178.
- action of hydroxylamine on *l*-dibromomenthylamine, A., i, 178.
- Kikina (Fraulein)**. See **Michael Konowaloff**.
- Kilgore, B. W.**, estimation of phosphoric acid by the molybdate-magnesia method and by a volumetric method, A., ii, 335.
- estimation of phosphoric acid by titration of the ammonium phosphomolybdate with standard alkali, A., ii, 335.
- Kiliani, Heinrich**, digitalin, A., i, 58.
- β -digitoxin, A., i, 59.
- *Digitalinum verum* (digitalin), A., i, 180.
- detection of the glucosides of digitalis, and products of their hydrolysis by means of sulphuric acid containing a ferric salt, A., ii, 551.
- Kiliani, Heinrich**, and **J. Schäfer**, quercitol, A., i, 586.
- Kinoshita, Y.**, consumption of asparagine in the nutrition of plants, A., ii, 54.
- assimilation of nitrogen from nitrates and ammonium salts by phæogams, A., ii, 54.
- occurrence of two kinds of mannan in the roots of *Conophallus Konjak*, A., ii, 60.
- asparagine in the roots of *Nelumbium nucifera*, A., ii, 61.
- Kionka, Heinrich**. See **Wilhelm Filehne**.
- Kippenberger, Karl**, titration of alkaloids with iodine solution, A., ii, 282, 682.
- reduction in neutral solutions, A., ii, 522.
- new method for quantitative isolation of alkaloids, A., ii, 681.
- Kipping, Frederick Stanley**, *o*-bromocamphoric acid, T., 61; P., 1895, 212.
- derivatives of camphoric acid. Part I, T., 913; P., 1895, 33, 88, 210; 1896, 114.
- π -dibromocamphoric acid and its derivatives, P., 1895, 211.
- Kipping, Frederick Stanley** and **William J. Pope**, π -chlorocamphoric acid, P., 1895, 213.
- Kipping, Frederick Stanley**. See also **Arthur Lapworth**, **Cecil Revis**.
- Kirkland, John Booth**, gallium and indium in a blende from Peelwood, N.S.W., A., ii, 183.
- Kissling, Richard**, estimation of nicotine and ammonia in tobacco, A., ii, 401.
- testing petroleum by fractional distillation, A., ii, 452.
- Kistiakowsky, Wladimir A.**, estima-

- tion of glycogen in liver and muscle, A., ii, 80.
- Kjeldahl, Johan Gustav Christophe Thorsager**, optical behaviour of some vegetable proteids, A., i, 583.
- behaviour of sugars towards alkaline copper solution, A., ii, 453.
- estimation of sugars by Fehling's solution, A., ii, 580.
- Klages, A.**, derivatives of metaxylene, A., i, 290.
- Klages, A.** See also **Ernst Jünger**.
- Klar, M.**, estimation of formaldehyde, A., ii, 226.
- Klein, J.** See **Paul Jacobson**.
- Klein, Karl.** See **Hugo Eckenroth**.
- Klement, Constantin**, process of formation of dolomite rock, A., ii, 116.
- Klimenko, Boris.** See **Euthyme Klimenko**.
- Klimenko, Euthyme**, influence of hydrochloric acid and chlorides on the photochemical decomposition of chlorine water, A., ii, 90.
- Klimenko, Euthyme**, and **Boris Klimenko**, action of hypochlorous acid on the chlorides of cobalt and manganese, A., ii, 303.
- Klimont, J.**, estimation of rosin oil in mineral oil, A., ii, 224.
- Klinger, Heinrich Conr.**, and **Carl Lonnes**, action of sulphuric acid on benzilic acid, A., i, 374.
- — benzhydrol ether and the benzopinacolins, A., i, 686.
- — diphenyldiphenylenepinacolin and tetraphenylenepinacolin, A., i, 691.
- — diphenyldiphenylenethylene and tetraphenylenethylene, A., i, 692.
- Klobb, Constant Timothée**, syntheses by means of ethylic cyanacetate, A., i, 126.
- Klockmann, Friedrich**, nickel ore [gersdorffite] from the upper Harz, A., ii, 307.
- Knecht, Maja.** See **Eugen Bamberger**.
- Knight, F. C.**, a suspected new mineral from Cripple Creek, A., ii, 613.
- Knobloch, J.**, preparation of pure zinc sulphate from crude zinc vitriol, A., ii, 562.
- Knoevenagel, Emil**, 1 : 5-diketones, A., i, 210.
- preparation of ethylic benzylideneacetoacetate, A., i, 232.
- syntheses in the camphor and terpene series, A., i, 286.
- Knoevenagel, Emil**, and **W. Renner**, action of hydroxylamine on ethylic benzylideneacetoacetate, A., i, 189.
- Knoevenagel, Emil.** See also **Ch. Gundlich**.
- Knorr, Ludwig**, pyrazolone, A., i, 259.
- isomerism in the pyrazole series: a reply to Rothenburg, A., i, 321.
- Knudsen, Peter**, and **Richard Wolffenstein**, collidinepiperidine, A., i, 60.
- Knueppel, Chr. A.**, improvement in Skraup's quinoline synthesis, A., i, 391.
- Knuttel, Daniel**, pyridine acetone chloride, A., i, 497.
- Köhler, A.** See **Oscar Kellner**.
- König, Franz Josef**, relative proportion of glucose and levulose in sweet wines, A., ii, 79.
- König, Franz Josef**, and **A. Bömer**, composition of meat extract, A., ii, 82.
- König, Franz Josef**, and **Emil Haselhoff**, injury to plants by nitrogen acids, A., ii, 210.
- — assimilation of the nutritive matters of soil by plants, A., ii, 213.
- König, Fritz.** See **Oscar Hinsberg**.
- Koenigs, Wilhelm**, merochinine, A., i, 63.
- dicarboxylic acids of the piperidine series, A., i, 251.
- replacement of the hydroxyl group of the cinchona alkaloids by hydrogen, A., i, 264, 328.
- Koenigs, Wilhelm**, and **August Husmann**, conversion of cinchonine into cinchonidine, A., i, 707.
- Koenigs, Wilhelm**, and **Fritz Wolff**, reduction products from cinchomeronic acid and from apophyllenic acid, A., i, 698.
- Koeppel, Hans**, osmotic pressure of blood plasma, and the formation of hydrochloric acid in the stomach, A., ii, 376.
- Körner, Wilhelm**, and **Angelo Menozzi**, a homologue of asparagine and derivatives of homoaspartic acid, A., i, 205.
- Koerpen, Georg.** See **Hugo Eckenroth**.
- Kohlrausch, Friedrich**, density determinations of extremely dilute solutions, A., ii, 89.
- the dilution law of salt solutions, A., ii, 295.
- Kohn, Leopold**, condensation of isovaleraldehyde, A., i, 10.
- action of alcoholic potash on isovaleraldehyde, A., i, 461.
- Kolb, Adalbert**, derivatives of phenylacetone, A., i, 576.
- Kolisch, Rudolf**, estimation of creatinine in urine, A., ii, 283.
- Kolk.** See **Schröder von der Kolk**.
- Koller, P.** See **Oscar Hinsberg**.
- Komppa, Gustav**, and **A. Bergroth**,

synthesis of camphoronic acid and its derivatives, A., i, 597.

Kondakoff, Iwan L., syntheses by means of zinc chloride, A., i, 462.

Konek von Norwall, Fritz, reduction products of cinchona alkaloids, A., i, 395.

Koninck, Lucien Louis de, volumetric estimation of platinochlorides: estimation of potassium, ammonium, nitrogen, and platinum, A., ii, 77.

— artificial hydrated magnesium silicate, A., ii, 480.

Koninck, Lucien Louis de, and **Eugene Prost**, volumetric estimation of zinc by means of potassium ferrocyanide, ii, 675.

Koningh, Leonard de, separation of solid and liquid fatty acids, A., ii, 226.

— testing for arsenic in alloys of tin and lead, A., ii, 273.

— estimation of sulphurous anhydride in carbolic powders, A., ii, 275.

— detection and estimation of barium sulphate, A., ii, 275.

— estimation of water in superphosphates, A., ii, 541.

— estimation of solid matters in beef-tea, A., ii, 552.

Konowaloff, Dmitri P., solubility of gases, A., ii, 351.

Konowaloff, Michaël I., nitration of menthone, A., i, 177.

— action of acids on salts of nitro-compounds, A., i, 675.

Konowaloff, Michaël I. [and, in part, (*Frl.*) **Kikina, Nikitin**, and **Tschitschkin**], nitration of saturated hydrocarbons. II. A., i, 673.

Kortright, Frederick Lawrence, heats of electrolytic dissociation of some acids, A., ii, 463.

Kosmann, Hans Bernhard, borates in the Stassfurt abraum salts, A., ii, 368.

— magnetic iron hydroxide, A., ii, 431.

Kossel, Albrecht Carl Ludwig Martin Leonhard, bases from the cell-nucleus, A., i, 582.

— thymine from the spermatozoa of the sturgeon, A., ii, 537.

Kossel, Albrecht Carl Ludwig Martin Leonhard, and **Albert Neumann**, nucleic and thymic acids, A., i, 658.

Kostanecki, Stanislaus von, and **Eugen Oppelt**, derivatives of orthohydroxybenzylideneacetophenone (phenyl orthohydroxystyryl ketone), A., i, 241.

Kostanecki, Stanislaus von, and **L. Podrajansky**, action of furfuraldehyde on acetophenone, A., i, 688.

Kostanecki, Stanislaus von, and **G.**

Rosbach, condensation of benzaldehyde with acetophenone, A., i, 556.

Kostanecki, Stanislaus von, and **G. Rosbach**, action of benzaldehyde on paratolyl methyl ketone, A., i, 688.

Kostanecki, Stanislaus von, and **M. Schneider**, ethers of unsaturated hydroxy-ketones, A., i, 614.

Kostanecki, Stanislaus von, and **Josef Tambor**, constitution of fisetin, A., i, 44.

— — phenyl α -coumaryl ketone, A., i, 239.

— — synthesis in the gentisin series, A., i, 369.

— — action of alkali on benzylideneacetophenone, A., i, 557.

Kostanecki, Stanislaus von. See also **Hermann Bablich**, **Arnold Cornelsson**, **G. Gurgenjanz**, **Ludwig Kesselkaul**.

Kotō Bundjirō, analysis of biotite and hornblende from Japan, A., ii, 39.

Kraemer, Gustav, and **Adolf Spilker**, the cyclopentadiene of coal-tar: the indene of the aliphatic series, A., i, 289.

Krafft, Friedrich, dehydro-undecylenic acid, A., i, 665.

— a theory of colloidal solutions, A., ii, 468.

Krafft, Friedrich, and **W. A. Dyes**, crystallised lactic acid of constant boiling point, A., i, 84.

— distillations with an automatic mercury pump, A., ii, 89.

Krafft, Friedrich, and **A. Kaschau**, synthesis of aromatic selenium compounds by means of aluminium chloride, A., i, 296.

— — thianthrene (diphenylene bisulphide) and selenanthrene (diphenylene diselenide), $C_{12}H_8Se_2$. II. A., i, 297.

Krafft, Friedrich, and **Robert Edward Lyons**, thianthrene (diphenylene bisulphide) $C_{12}H_8S_2$, and selenanthrene (diphenylene diselenide). I. A., i, 297.

— — diphenylselenone, SeO_2Ph_2 , A., i, 304.

Krafft, Friedrich, and **A. Strutz**, behaviour of soap-like substances in presence of water. V., A., ii, 467.

Krafft, Friedrich, and **H. Weilandt**, boiling points in the vacuum of the cathode light, A., ii, 464.

— — sublimation temperatures in the vacuum of the cathode-light, A., ii, 635.

Krafft, Friedrich, and **Hermann Wig-**

- low, behaviour of the alkali salts of the fatty acids and of soaps in presence of water. III. The soaps as crystalloïds. IV. The soaps as col-loïds, A., i, 80.
- Krakau, Alexander A.**, electrical conductivity and dissociation tension of palladium hydride, A., ii, 5.
- Kramm, William**, a new solvent for urinary pigments, A., ii, 666.
- Kratz, K.**, derivatives of metanitroorthamidobenzhydrazide and metanitroorthamidobenzamide, A., i, 364.
- Kraus, Emil**. See **Eugen Bamberger**.
- Krehl, Ludolf**, and **Max Matthes**, febrile albuminuria, A., ii, 667.
- Kreichgauer, Anton**. See **Max Conrad**.
- Kreider, D. Albert**, estimation of perchlorate, A., ii, 123.
- convenient forms of laboratory apparatus, A., ii, 161.
- Kreis, Hans**, parabromanilinesulphonic acids: a new method of preparing benzoic sulphinide, A., i, 48.
- Kremel, Alois**, detection of aloes in mixtures, A., ii, 401.
- Kremers, Edward**, limonene and its derivatives, A., i, 177.
- Kremers, Edward**. See also **John L. Mead**.
- Kremla, H.**, composition of pure fruit juices, A., ii, 62.
- Krenner, József Alexander**, Lorandite, a new thallium mineral, A., ii, 30.
- Kriebel, Felix**. See **Richard Möhlau**.
- Kritschenko**. See **Petrenko-Kritschenko**.
- Kromer, Nicolai**, convolvulus resins, A., i, 385.
- Kromschröder, Geo.** See **Carl Paal**.
- Krüger, M.** See **F. Mann**.
- Krüger, Martin**, two new bases in the urine of the insane, A., i, 62.
- isolation of adenine from tea extract, A., i, 450.
- estimation of uric acid in urine, A., ii, 281.
- Krüger, Martin**, and **George Anton Salomon**, constitution of heteroxanthine and its physiological action, A., ii, 200.
- Krüger, Paul**. See **Johann Carl Wilhelm Ferdinand Tiemann**.
- Krüger, Theodor Richard**, elimination of carbonic anhydride from phosphoric acid by hydrolysis, A., ii, 487.
- Krüss, Gerhard**, relations between the composition and absorption spectrum of organic compounds, A., ii, 285.
- Krüss, Gerhard**, and **Hugo Krüss**, new method of quantitative spectrum analysis, A., ii, 215.
- Krüss, Hugo**. See **Gerhard Krüss**.
- Krummacher, Otto**, influence of muscular work on proteïd metabolism, A., ii, 377.
- Krusch, P.**, [Phillipsite from Wigen-dorf, Prussian Silesia], A., ii, 532.
- Kubli, Melchior**, new method of testing quinine, A., ii, 550.
- Kühling, Otto**, displacement of isodiazogroups by cyclic radicles. II. A., i, 236.
- Kühn, M.**, margarine cheese and its analysis, A., ii, 82.
- Kuenen, J. P.**, the condensation and critical phenomena of mixtures of ethane and nitrous oxide, A., ii, 10.
- Kuenen, J. P.**, and **Wyatt W. Randall**, expansion of argon and of helium as compared with that of air and hydrogen, A., ii, 597.
- Küster, Friedrich Wilhelm**, a reversible reaction of the first order, A., ii, 158.
- action of ferric salts on iodides in aqueous solution, A., ii, 302.
- solubility of barium sulphate, A., ii, 625.
- Küster, William**, haematin, A., i, 516.
- Kulisch, Victor**, lophine and glyoxalines, A., i, 626.
- Kunkel, Josef Adam**, formation of blood from inorganic iron, A., ii, 47.
- Kunz, George Frederick**, phosphorescent diamonds, A., ii, 306.
- Kurbatoff, Apollon A.**, extraction apparatus for liquids, A., ii, 355.
- Kurnakoff, Nicolai**, constitution of metallic bases, A., ii, 170.

L.

- Laar, J. J. van**, formulæ for osmotic pressure, alterations of solubility, freezing point and boiling point, and heats of solution and dilution in dissolved dissociated substances, A., ii, 154.
- Laborde, J. B. Vincent**, estimation of glycerol in fermented liquors, A., ii, 77.
- fermentation of maltose by the mould *Eurotiosis Gayoni*, A., ii, 321.
- specific gravity and specific heat of alloys of iron and antimony, A., ii, 652.
- Lachmann, Arthur**, nitrogen pentethyl, A., i, 460.

- Lachmann, Arthur**, constitution of acid amides, A., i, 601.
- Lachmann, Arthur**. See also *Johannes Thiele*.
- Lacroix, Alfred**, optical properties of some compact and earthy silicates, A., ii, 187.
- Ladenburg, Albert**, lysidine, A., i, 201.
- isopiepeoline, A., i, 318.
- constitution of tropine, A., i, 326.
- specific refractive powers of pyrotartaric acid, A., i, 464.
- molecular symmetry and asymmetry, A., ii, 244.
- Lamberti-Zanardi, Manfredo**, carbazole derivatives, A., i, 304.
- action of chlorine on benzoylnitrocarbazole, A., i, 651.
- Lander, G. Druce**. See *Francis Robert Japp*.
- Landolt, Hans Heinrich**, modified form of polarimeter for chemical purposes, A., ii, 230.
- Landsteiner, Karl**, colour reactions of proteids with nitrous acids and phenols, A., i, 584; ii, 284.
- Landsteiner, Karl**. See also *Roland Scholl*.
- Lang, Robert**, relation between the dielectrical constants of gases and their chemical valency, A., ii, 144.
- Lange, Gerhard**, estimation of cellulose, A., ii, 278.
- Langlet, Nils Abraham**, atomic weight of helium, A., ii, 99.
- Langlois, Paul**. See *Athanasius*.
- Lannoy, S. de**, the thermal expansion of salt solutions, A., ii, 233.
- Lappe, J.** See *Franz Röhmann*.
- Lapworth, Arthur**, note on the formation of camphorquinone from α -chloronitrocamphor, T., 322; P., 1896, 76.
- Lapworth, Arthur**, and *Frederick Stanley Kipping*, isomeric π -bromo- α -nitro-camphors, T., 304; P., 1895, 209; 1896, 77.
- derivatives of camphensulphonic acids, T., 1546; P., 1895, 57; 1896, 152, 188.
- Larbalétrier, A.**, and *L. Malpeaux*, manurial effects of magnesium compounds and of iron sulphate, A., ii, 445.
- Larsson, Aksel**, niobium, A., ii, 564.
- Laspeyres, Ernst Adolph Hugo**, and *Erich Kaiser*, calcistrontite, "feather ore," A., ii, 660.
- Lassar-Cohn**, formation of ethylcholate, A., i, 582.
- Laszczynski, St. von**, conductivity of solutions of some salts in acetone, A., ii, 555.
- Laszczynski, St. von**, electrolysis of solutions of salts in acetone, A., ii, 556.
- Laur, Francis**, composition of bauxite, A., ii, 430.
- Lauth, Charles**, dithiazolic derivatives, A., i, 326.
- Law, Robert**, an auxiliary assay balance, T., 526; P., 1896, 75.
- Lawrence, William Trevor**, compounds of sugars with ethylene mercaptan, trimethylene mercaptan, and benzyl mercaptan, A., i, 272.
- Laycock, William Frederick**, an examination of the products obtained by the dry distillation of bran with lime, P., 1896, 38.
- Lazarus-Barlow, W. S.**, initial rate of osmosis of certain substances in water and in liquids containing albumin, A., ii, 196.
- formation of lymph, A., ii, 485.
- initial rate of osmosis of blood serum, A., ii, 664.
- Lea, Matthew Carey**, new relations between the atomic weights of the elements, A., ii, 594.
- relations between the colours of atoms, ions, and molecules. II. A., ii, 639.
- Leathes, J. B.**, artificial hydræmic plethora, A., ii, 50.
- exchange of liquid between blood and tissues, A., ii, 196.
- Lebeau, Paul**, preparation of pure beryllium oxide from emerald, A., ii, 168.
- beryllium carbide, A., ii, 169.
- analyses of the emerald, A., ii, 187.
- Leben, J. A.**, phenyleoumalin, A., i, 574.
- Le Blanc, Max**, thermodynamics of galvanic polarisation, A., ii, 4.
- Le Blanc, Max**, and *P. Rohland*, influence of electrolytic dissociation, &c., on the molecular refraction, A., ii, 345.
- Le Bon, Gustave**, kola nut, A., ii, 64.
- dark radiations, A., ii, 347.
- Lecco, Marco T.**, occurrence of iodine in waters, A., ii, 579.
- Lechartier, G.**, analysis of soil by plants, A., ii, 330.
- Le Chatelier, Henri Louis**, combustion of acetylene, A., i, 271.
- some melting and boiling points, A., ii, 87.
- heats of formation of manganese compounds, A., ii, 350.

- Ledden Hulsebosch, *Marius L. Q. van*, testing cinchona extract, A., ii, 682.
- Lee, *T. H.*, reactions of formaldehyde, A., i, 124.
- Leent, *Frederik Hendrik van*, action of methyl alcoholic potash on 2 : 4 : 6-trinitrobenzoic acid, A., i, 614.
- Leent, *Frederik Hendrik van*. See also *Cornelis Adriaan Lobry de Bruyn*.
- Legler, *Ludwig*, estimation of zinc in dried apples, A., ii, 450.
- Lehmann, *Franz*, metabolism experiment on sheep with a Pettenkofer respiration apparatus, A., ii, 262.
- Lehmann, *Karl Bernhard*, hygienic studies on copper, A., ii, 486.
- Lehmann, *Olto*, passage of electricity through gases, A., ii, 143.
- running together and healing of crystals, A., ii, 160.
- Lehnert, *H.* See *Paul Jannasch*.
- Lemaire, *Cl.* See *Henri Lescœur*.
- Lemaire, *F. A.*, milk sugar in the urine after childbirth, A., ii, 490.
- Lemberg, *Johann*, microchemical reactions of minerals of the lamprite group, A., ii, 430.
- Lemoine, *Georges*, relation between the intensity of light and its action on mixtures of ferric chloride and oxalic acid, A., ii, 285.
- Lemoult, *Paul*, action of carbonic anhydride, water and alkalis on solutions of cyanuric acid and alkali cyanurates, A., i, 70.
- thermochemistry of cyanuric acid and its alkali salts, A., ii, 11.
- Lengfeld. See *Henri Moissan*.
- Lengfeld, *Felix*, and *Julius Stieglitz*, thiamines, A., i, 79.
- Lehner, *Victor*, lead sulphiodide, A., ii, 523.
- Lehner, *Victor*. See also *W. B. Rising*.
- Lenz, *M.* See *Heinrich Limpricht*.
- Leonardi, *Aristide*. See *Girolamo Mazzara*.
- Leonhardt, *Max*. See *Carl Graebe*.
- Lepel, *Victor von*. See *Richard Stoermer*.
- Lépine, *E.*, acidity of urine, A., ii, 397.
- Lescœur, *Henri*, alcoholates, A., i, 113.
- Lescœur, *Henri*, and *Cl. Lemaire*, volumetric estimation of zinc, A., ii, 501.
- Lespieau, *Robert*, bromo-derivatives of tri-carbon nuclei, A., i, 332.
- Lesser, *Rudolph*. See *Rudolph Fittig*.
- Levin, *Isaac*, fat absorption, A., ii, 376.
- Levin, *P.*, testing vegetable oils and butter, A., ii, 454.
- Lévy, *Lucien*, titanium silicide and crystallised titanium, A., ii, 304.
- Levy, *Ludwig*, and *Richard Wolfenstein*, stereoisomeric copellidines. II. A., i, 624.
- Lewes, *Vivian Byam*, the acetylene theory of luminosity, T., 226 ; P., 1896, 1 ; discussion, *ibid.*, 3.
- action of heat on ethylene, A., i, 113.
- cause of luminosity in the flames of hydrocarbon gases, A., ii, 141.
- Lewin, *Louis*, *Anhalonium Lewinii* and other cacti, A., i, 194.
- a forensic examination for strychnine, A., ii, 551.
- Lewkowitsch, *Julius*, analysis of fats : colour reactions, A., ii, 393.
- assay of dynamite glycerol, A., ii, 452.
- Ley, *Heinrich*, reaction velocity of intramolecular change in stereoisomeric oximes, A., ii, 243.
- Lichty, *David M.*, etherification of substituted acetic acids, A., ii, 557.
- Lidoff, *Alexander P.*, gas pipette of simple construction, A., ii, 385.
- Lieben, *Adolf*, constitution of glycols formed by the action of potash on aldehydes, A., i, 403.
- Liebenberg, *Adolf von*, phosphate manuring, A., ii, 214.
- Liebermann, *Carl Theodor*, tautomerism of the orthoaldehydic acids, A., i, 232, 682.
- synthesis of an isomeric narcotine, A., i, 264.
- alloisomerism, a rejoinder to Michael, A., i, 347.
- derivatives of isonarcotine, A., i, 711.
- Liebermann, *Carl Theodor* and *Gustav Cybulski*, euskhygrine, A., i, 710.
- Lieblein, *Victor*, a dermoid cyst, A., ii, 263.
- Lifschütz, *Isaac*. See *L. Darmstaedter*.
- Likhatscheff, *Alexis*, physiological action of gentisic acid, A., ii, 492.
- Limb, *Claudius*, separation of atmospheric argon and nitrogen, A., ii, 299.
- Limpricht, *Heinrich*, ketones, A., i, 40.
- benzoylsalicylic acid, A., i, 435.
- Limpricht, *Heinrich*, and *H. Falkenberg*, metanitrophenyl xylyl ketones, A., i, 43.
- Limpricht, *Heinrich*, and *M. Lenz*,

- metanitrophenyl paratolyl ketone, A., i, 40.
- Limpricht, Heinrich**, and **E. Samietz**, paranitrophenyl paratolyl ketone, A., i, 42.
- Linck, Gottlob Ed.**, hereynite from Valtellina, A., ii, 183.
- Linde, Karl**, production of very low temperatures and liquefaction of gases, A., ii, 232.
- Lindemann and Motteu**, volumetric estimation of phosphorus, A., ii, 388.
- Lindet, Léon**, identification and isolation of acids contained in plants, A., ii, 539.
- Lindner, A.**, Clarke and Schneider's constitutional formula for serpentine, A., ii, 369.
- Lindner, Paul**. See **Emil Fischer**.
- Linebarger, Charles Elijah**, some relations between temperature, pressure, and latent heat of vaporisation, A., ii, 9.
- vapour tensions of mixtures of volatile liquids, A., ii, 408.
- the dielectric constant of liquid mixtures, A., ii, 509.
- Linebarger, Charles Elijah**, See also **Marc Delafontaine**.
- Lintner, Carl Joseph**, inversion of maltose and isomaltose by means of yeast, A., i, 4.
- action of diastase on isomaltose, A., i, 119.
- Lipp, Andreas**, synthesis of tetrahydropyridine derivatives and their conversion into piperidine derivatives, A., i, 317.
- Lippmann, Edmund O. von**, cause of birotation, A., ii, 230.
- Lippmann, Eduard** and **Franz Fleissner**, hydrogenation of quinine, A., i, 63.
- Lischke, W.** See **Paul Jacobson**.
- Liversidge, Archibald**, nantokite from New South Wales, A., ii, 31.
- boleite from New South Wales, A., ii, 32.
- some New South Wales and other minerals, ii, 657.
- Locher, E.** See **Friedrich Kehrman**.
- Lockyer, Joseph Norman**, new gases obtained from uraninite, A., ii, 596, 597.
- gases obtained from the mineral eliasite, A., ii, 597.
- Lodholz, Karl**. See **Adolph Claus**.
- Lodter, Wilhem**. See **Eugen Bamberger**.
- Loeb, Jacques**, physiological action of want of oxygen, A., ii, 318.
- Löb, Walther**, new method of research in organic chemistry, A., i, 533.
- electrolytic reduction of nitrobenzene in presence of hydrochloric acid, A., i, 605.
- Loew, Oscar**, the physiological action of amidosulphonic acid, T., 1662; P., 1896, 182.
- formation of proteïds in plant cells, A., ii, 55.
- active albumin as reserve material in plants, A., ii, 58.
- behaviour of hippuric acid in soils, A., ii, 67.
- Loew, Oscar**, and **Seiroku Honda**, effects of different amounts of lime and magnesia on the development of pine trees, A., ii, 446.
- Löwenherz, Richard**, depression of the melting point of sodium sulphate by the addition of foreign substances, A., ii, 149.
- influence of ethylic alcohol on the electrolytic dissociation of water, A., ii, 587.
- Loges, Gustav**, action of vegetable acids on insoluble phosphates in presence of nitrates, A., ii, 620.
- Lohnstein, Theodor**, densimetric estimation of *d*-glucose in urine, A., ii, 128.
- Lohse, Otto**, condensation of benzophenone chloride with benzene and toluene: tetraphenylethylene, A., i, 619.
- Long, John Harper**, inversion of sugar by salts, A., ii, 414.
- Longi, Antonio**, rapid estimation of fat in milk: a new lactobutyrometer, A., ii, 228.
- Longi, Antonio**, and **L. Bonavia**, volumetric estimation of lead, A., ii, 625.
- Longi, Antonio**, and **G. Mazzolino**, supposed compound of cyanoform and mercuric iodide, A., i, 517.
- Longinescu, G. G.** See **Wilhelm Traube**.
- Longo, E.** See **Arturo Miolati**.
- Lonnes, Carl**. See **Heinrich Conr. Klinger, Franz Richarz**.
- Lookeren, C. J. van**, and **P. J. van der Veen**, formation of indigo in plants of the order *Indigofera*, A., ii, 207.
- Loomis, E. H.**, freezing points of dilute aqueous solutions, A., ii, 352.
- determination of the freezing points of dilute solutions, A., ii, 353.
- Loon, J. van**, and **Victor Meyer**, fluorine and the law of etherification, A., i, 434.

- Lord, Nathaniel Wright**, simple method for determining the neutrality of the ammonium citrate solution used in the analysis of fertilisers, A., ii, 623.
- Lorenz, Richard**, conversion of chlorine into hydrogen chloride, A., ii, 17.
- electrolytic preparation of zinc and lead, A., ii, 22.
- preparation of tin tetrachloride in large quantities, A., ii, 28.
- electrolytic decomposition of fused zinc chloride, A., ii, 586.
- twin elements, A., ii, 639.
- electrochemical method of preparing metallic hydroxides, A., ii, 647.
- electrochemical method of preparing metallic sulphides, A., ii, 648.
- preparation of potassium permanganate by electrochemical means, A., ii, 650.
- preparation of potassium dichromate by electrochemical means, A., ii, 651.
- Losanitsch, Sima M.**, analyses of gold, meerschaum, amber, and magnetite from Servia, A., ii, 252.
- Loth, George**. See **Carl D. Harries**.
- Lottermoser, C. A. Alfred**, action of sodium on aromatic nitriles, A., i, 298.
- Louguinine**. See **Luginin**.
- Lovén, Johan Martin**, stereoisomeric thiodilactic acids, A., i, 412.
- thiodihydraacrylic acid and β -sulphonedipropionic acid, A., i, 412.
- unsymmetrical homologues of thiodiglycollic acid and of sulphonediacetic acid, A., i, 412.
- affinity constants of some organic acids, A., ii, 412.
- chemical equilibrium in ammoniacal solutions of magnesium salts, A., ii, 413.
- temperature coefficient of the electromotive force of silver cells, A., ii, 635.
- Lovisato, Domenico**, the senarmontite of Nieddoris and the minerals which accompany it, arite, breithauptite, gersdoffite, and smaltite, A., ii, 183.
- Lovreković, St.**, zoisite from Styria, A., ii, 433.
- Low**, the iodide assay for copper, A., ii, 450.
- Luboldt, Walter**, seopoleïne, A., i, 396.
- seopolamine, A., i, 514.
- Lucas, Ad.**, formation of 1 : 2 : 3-trimethylbenzene together with synthetic mesitylene, A., i, 418.
- Lucchesi, Adolfo**. See **Ubaldo Antony**.
- Luchmann, A.**, halogen derivatives of fatty amines, A., i, 544.
- Ludwig, Eugen**, use of aldehydes containing ozone for the detection of small quantities of iodine in presence of chlorine and bromine, A., ii, 542.
- Lüdecke, Otto**, epidote from the Harz, A., ii, 312.
- Luginin, Wladimir F.**, latent heats of vaporisation of ketones and other compounds, A., ii, 146.
- Lumsden, John S.** See **Alfred Einhorn**.
- Lunge, Georg**, separation of quartz from other varieties of silica, A., ii, 275.
- colorimetric estimation of iron, A., ii, 392.
- estimation of sulphur in pyrites, A., ii, 498.
- precipitation of barium sulphate by means of barium chloride, A., ii, 672.
- Lungwitz, Emil E.** See **Hugo Schweitzer**.
- Luquer, Lea McIlvaine**, and **Gustave J. Volckening**, analyses of sodalite from new localities, A., ii, 37.
- Lusini, Valerio**, physiological action of ureides. I. Alloxan, alloxantin, and parabanic acid, A., ii, 492.
- Lustig, Franz**, amido-derivatives of paraxylene, A., i, 162.
- Luther, Robert**, electromotive force and partition equilibrium, A., ii, 461.
- Luxembourg, K.** See **Carl Arnold August Michaelis**.
- Luxmore, Charles Mann**, the oximes of benzaldehyde and their derivatives, T., 177; P., 1895, 149.
- Luz, H.**, ammoniacum, A., i, 249.
- Luzi, Willi**, graphitoid, A., ii, 366.
- Lyons, Robert Edward**. See **Friedrich Krafft**.
- *Serena*
p. 1053
M.
- Maas**. See **Harry Frederick Keller**.
- Mabery, Charles Frederic**, composition of the Ohio and Canadian sulphur petroleum, A., i, 269, 270.
- [estimation of sulphur by combustion in air], A., ii, 387.
- estimation of sulphur in illuminating gas and in coal, A., ii, 387.
- Mabery, Charles Frederic** and **J. H. Byerley**, artificial production of asphalt from petroleum, A., i, 329.

- Mabery, Charles Frederic** and **Orton C. Dunn**, investigations on American petroleum: chemistry of the Berea grit petroleum, A., i, 329.
- Macallum, A. B.**, assimilated iron compounds in animal and vegetable cells, A., ii, 317.
- McCay, Le Roy W.**, existence of thioxyantimonates, A., ii, 305.
— sodium thioarsenate, A., ii, 359.
- McFarland, B. W.** See *Henry Lord Wheeler*.
- MacGregor, John.** See *Percy Faraday Frankland*.
- Mach, F.**, and **Max Passon**, application of the citrate process to Wagner's method for the estimation of citrate-soluble phosphoric acid in basic slags, A., ii, 389.
- McIntosh, Douglas**, calculation of the conductivity of mixtures of electrolytes having a common ion, A., ii, 555.
- Mackenzie, John Edwin**, dimethoxydiphenylmethane and some of its homologues, T., 985; P., 1896, 117.
- Maclaurin, J. S.**, double sulphides of gold and other metals, or the action at a red heat of sulphur on gold when alloyed with other metals, T., 1269; P., 1896, 149.
— the relative weights of gold and silver dissolved by potassium cyanide solutions from alloys of these metals, T., 1276; P., 1896, 149.
- McLeod, Herbert**, liberation of chlorine during the heating of a mixture of potassic chlorate and manganic peroxide, T., 1015; P., 1896, 141.
- McPherson, William**, constitution of the hydroxy-azo-compounds, A., i, 27.
- M'Roberts, George**, obituary notice of, T., 734.
- Märcker, Max Heinrich**, investigations [on manures] at Halle, A., ii, 269.
- Magnanini, Gaetano**, absorption spectra of some chromothiocyanates, A., ii, 345.
- Magnier de la Source, Louis**, reactions of tartaric acid and alkali tartrates, A., i, 206.
- Mahla, Friedrich**, and **Johann Carl Wilhelm Ferdinand Tiemann**, terpenylic acid, A., i, 385.
- Mai, Carl.** See *Albert Hilger*.
- Mai, Ludwig.** See *Arthur Rudolf Hantzsch*.
- Makin, C. J. S.** See *Heinrich Frese-nius*.
- Malbot, H.**, and **A. Malbot**, phosphates from Algeria. Phosphatic rock at Bougie having the composition of a superphosphate, A., ii, 185.
- Maljean.** See *Balland*.
- Mallèvre, Alfred.** See *Gabriel Bertrand*.
- Malpeaux**, use of sugar in cattle feeding, A., ii, 662.
- Malpeaux, L.** See *A. Larbaetrier*.
- Maltby, Margaret E.**, determination of high resistances, A., ii, 144.
- Manceau, E.**, estimation of tannin in wines, A., ii, 282.
- Manck, Philipp.** See *Hans von Pechmann*.
- Mankiewicz**, detection of strychnine in a medico-legal case, A., ii, 344.
- Mann, F., M. Krüger**, and **Bernhard Tollens**, estimation of pentoses and pentosans by the furfuraldehyde distillation process, A., ii, 393.
- Mann, F.**, and **Bernhard Tollens**, furfuraldehyde and carbonic anhydride from glycuronic acid, A., i, 417.
— — euxanthone, A., i, 449.
- Mann, Paul.** See *Rudolf Hefelmann*.
- Mantz, B. von.** See *Carl Graebe*.
- Manuelli, C.** See *G. Ampola*.
- Manzella, E.** See *Giuseppe Oddo*.
- Maquenne, Léon**, explosion of endothermic gases, A., ii, 87.
— combination of nitrogen with metals of the alkaline earths, A., ii, 299.
— accumulation of sugar in the root of the beet, A., ii, 328.
- Marchetti, G.**, fluorides and oxyfluorides of potassium, A., ii, 20.
- Marchlewski, Leo**, isatin, A., i, 449.
- Marchlewski, Leo.** See also *Edward Schunck*.
- Marcille**, nitrification, A., ii, 669.
- Marckwald, Wilhelm**, tautomerism, A., i, 29.
— easy method of preparing lævoptatory tartaric acid, A., i, 207.
— optically active 2-pipeccolines and "isopipecoline," A., i, 253.
— Ladenburg's "isopipecoline," A., i, 497.
- Marckwald, Wilhelm.** See also *O. Schütz*.
- Marcuse, Gotthelf**, nutritive value of casein, A., ii, 663.
- Marie, C.**, and **R. Marquis**, new mode of formation of nitroprussides, A., i, 403.
— — iron nitrososulphides, A., ii, 364.
- Marie, Theod.**, cerotic and melissic acids: the free acids of beeswax, A., i, 346.

- Marie, Theod.**, glycerylic cerotates and melissates, A., i, 347.
- Mark, Thor.** See *Wilhelm Ostwald*.
- Markownikoff, Wladimir B.**, mixer for accelerating chemical reactions, A., ii, 297.
- Marloth, R.**, origin of nitrates in Griqualand West, A., ii, 529.
- Marquis, R.** See *C. Marie*.
- Marsden, Fred.** See *Paul Jacobson*.
- Marsh, James Ernest** and *John Addyman Gardner*, researches on the terpenes. VI. Products of the oxidation of camphene. Camphoic acid and its derivatives, T., 74, P., 1895, 206; discussion, *ibid.*, 206.
- Marshall, B. Mervyn C.**, the rotation of aspartic acid, T., 1022, P., 1896, 146.
- Marshall, Dorothy**, heat vaporisation of formic acid, A., ii, 589.
- Marshall, Dorothy**; and *William Ramsay*, method of comparing directly the heats of evaporation of different liquids at their boiling points, A., ii, 349.
- Marshall, Dorothy.** See also *Ernest Howard Griffiths*.
- Marshall, Patrick**, tridymite-trachyte of Lyttelton, New Zealand, A., ii, 193.
- Martens, Pablo**, a new cobalt mineral, A., ii, 529.
- Martin, Charles James**, a rapid method of desiccating and sterilising serum, A., ii, 263.
- separation of colloids and crystalloids, A., ii, 665.
- Marwedel, J.** See *Karl Auwers*.
- Massol, Gustave**, melting and solidifying points of some fatty acids, A., i, 408.
- Massol, Gustave**, and *Guillot*, specific heats of superfused formic and acetic acids: apparatus for the determination of the specific heats of superfused liquids, A., ii, 8.
- Masson, L.**, and *Albert Reyckler*, menthene and tertiary menthol, A., i, 620.
- Matignon, Camille**, and *Deligny*, nitro-substitutions, A., ii, 88.
- Matthaiopoulos, Georg.** See *Roland Scholl*.
- Matthes, Max.** See *Ludolf Krehl*.
- Matthews, J. Merritt.** See *Edgar Francis Smith*.
- Maul, R.** See *Albert Stutzer*.
- Mauro, Francesco**, thallous fluoroxy-molybdate and fluoroxyhypomolybdate, A., ii, 248.
- Mauthner, Julius** and *Wilhelm Suida*, derivatives of cholesterol, A., i, 425.
- Mauzelius, Robert**, and *Albert Vesterberg*, estimation of calcium and magnesium carbonates in soil, A., ii, 219.
- Mawrow, W.**, and *Wilhelm Muthmann*, estimation and separation of copper, A., ii, 338.
- Mayo, N. S.**, cattle poisoning by potassium nitrate, A., ii, 264.
- Mayrhofer, Joseph**, estimation of sugar in preserved fruits, A., ii, 225.
- Mazzara, Girolamo**, and *Aristide Leonardini*, new bromo-derivatives of carbazole, A., i, 392.
- Mazzolino, G.** See *Antonio Longi*.
- Mead, John**, and *L. Edward Kremers*, from pinene to carvacrol, A., i, 54.
- Medicus, Ludwig**, estimation of aldehyde in spirits of wine, A., ii, 505.
- Mehrländer, H.** See *Ernst Beckmann*.
- Meillère, G.**, the molybdic reagent, A., ii, 389.
- estimation of free and combined carbonic anhydride in carbonated waters, A., ii, 391.
- Meldola, Raphael**, mononitroguaiacol, P., 1896, 125.
- Meldola, Raphael**, and *Ernest Robert Andrews*, the alkaline reduction of metanitriline, T., 7; P., 1895, 214.
- Meldola, Raphael**, and *Frederick William Streatfeild*, mixed diazoamides containing an ortho-nitro group, P., 1896, 49.
- — allylparadinitrodiazoamido-benzene: a study of the relations between melting point and constitution, P., 1896, 51.
- Meldola, Raphael**, *George Harold Woolcott*, and *Edward Wray*, contributions to the chemistry of the phenol derivatives, T., 1321; P., 1896, 163.
- Melville, William Harlow**, analysis of anorthite from Raymond, Maine, A., ii, 38.
- Mendel, Lafayette B.**, passage of sodium iodide from the blood to the lymph, A., ii, 315.
- paralytic intestinal juice, A., ii, 617.
- Menozzi, Angelo.** See *Wilhelm Körner*.
- Merck Carl Emanuel**, benzylidene- β -dinaphthyllic oxide, A., i, 52.
- quassole, a substance accompanying quassin, A., i, 59.
- artemisin, a substance accompanying santonin, A., i, 59.
- scopoleins (ethereal salts of scopoline), A., i, 65.
- tropeins, A., i, 65.

- Merck, Carl, Emanuel**, paucine, A., i, 68.
- Merrill, George Perkins**, origin and composition of onyx marbles, A., ii, 260.
- disintegration of granite in the district of Columbia, A., ii, 483.
- Meslans, Maurice**, and **F. Girardet**, acid fluorides, A., i, 346.
- Metcalf, W. F.** See **Arthur Rudolf Hantzsch**.
- Metzner, René**, preparation of selenic acid, ii, 642.
- Meunier, Jean**, dichloralglucose, and chloralglucosan, A., i, 334.
- Meyenburg, Friedrich von**, action of carbonyl chloride on dimethyl and diethyl-metamidophenol, A., i, 292.
- Meyer, Carl**. See **Johannes Thiele**.
- Meyer, Ernst Sigismund Christian von**, mandelonitrile, A., i, 420.
- paratoluenesulphinic acid, A., i, 684.
- Meyer, Friedrich**. See **Paul Jacobson**.
- Meyer, Fred. L.** See **Edgar F. Smith**.
- Meyer, George**, potential differences between metals and electrolytes, A., ii, 143.
- Meyer, Hans**, anemonin, A., i, 623.
- Meyer, Hans**. See also **Joseph Herzig**.
- Meyer, Heinrich**. See **Richard E. Meyer**.
- Meyer, Julius Lothar**, memorial lecture on, T., 1403; P., 1896, 119.
- Meyer, Richard E.**, and **Heinrich Meyer**, the phthalein groups, A., i, 174.
- — — estimation of benzoyl- and acetyl-groups, A., ii, 226.
- Meyer, Victor**, etherification of aromatic acids, A., i, 170.
- the benzene problem, A., i, 213.
- formation and hydrolysis of etheral salts, A., i, 228.
- — — formation of salts from trinitrobenzene, A., i, 419.
- preparation of mono- and di-acetyl derivatives of aromatic hydrocarbons, A., i, 433.
- new experiments on the law of formation of oximes, hydrazones, and ethereal salts, A., i, 433.
- diacetylmesitylene, A., i, 547.
- fusibility of platinum in a wind-furnace fed with carbon, A., ii, 429.
- Meyer, Victor**, and **Wilhelm Pemsel**, peculiar decomposition of diiodoacetylene, A., i, 517.
- Meyer, Victor**, and **Wilhelm Rauhm**, combination of hydrogen with oxygen, A., ii, 162.
- Meyer, Victor**, and **Carl Sohn**, new method of formation of trimethyl-mandelic [*syn*-trimethylphenylglycollic] acid, A., i, 434.
- Meyer, Victor**, [and in part **Carl Sohn**], chemistry of etherification, A., i, 547.
- Meyer, Victor**. See also **Fritz Baum**, **Georg Heyl**, and **J. van Loon**.
- Meyerhoffer, Wilhelm**, reciprocal salt pairs, A., ii, 414.
- Michael, Arthur**, alloisomerism, A., i, 130.
- the laws of alloisomerism, and their employment in classifying unsaturated organic compounds, A., i, 133.
- alloisomerism: remarks on the work of Bischoff, Wislicenus, and van't Hoff, A., i, 134.
- formation of additive products from the sodium compounds of ethylic formylacetate, acetoacetate, and nitroethane, A., i, 593.
- action of ethylic iodide and zinc on ethereal salts of $\Delta^{\alpha\beta}$ -unsaturated acids of the aliphatic series, A., i, 597.
- [bromocinnamic acids: alloisomerism], A., i, 682.
- Michael, Arthur**, and **John E. Bucher**, action of acetic anhydride on the acids of the acetylene series, A., i, 85.
- — — constitution of oxalacetic acid, A., i, 599.
- Michael, Arthur**, and **T. H. Clark**, relative ease of elimination of carbonic anhydride from the silver salts of the β -chlorocrotonic acids, A., i, 132.
- Michael Arthur**, and **George Tissot**, alloisomerism, A., i, 132.
- Michaelis, Carl Arnold August**, and **K. Luxembourg**, inorganic derivatives of secondary aliphatic amines, A., i, 343.
- Michaelis, Carl Arnold August**, and **E. Silbertstein**, oxyphosphazo-compounds, A., i, 344.
- Michaelis Hugo**, modification of Liebig's condenser, A., ii, 91.
- Michaelis, K.** See **Paul Jacobson**.
- Michaelis, Paul**. See **Carl Friedheim**.
- Michel, Léopold**, melanterite containing zinc, A., ii, 36.
- artificial powellite, A., ii, 36.
- Hautefeuilleite, from Bamle, Norway, A., ii, 112.
- Miller, Alfred S.**, ammonia and the chlorides of iron, A., ii, 26.
- Miller, E. R.** See **Paul C. Freer**.
- Miller, Wilhelm von**, and **Hans Hofer**, electrolytic synthesis of monocarboxylic acids of the fatty series, A., i, 10.
- Miller, Wilhelm von**, and **Josef Plöchl**,

- thioaldolaniline and aldehyde-green, A., i, 216.
- Miller, Wilhelm von**, and **Josef Plöchl**, new reactions and new isomerides of anil compounds, A., i, 609.
- Miller, Wilhelm von**, and **Josef Plöchl** [with **G. Mozdzyński**], stereochemistry of nitrogen compounds, A., i, 534.
- Mingaye, John C. H.**, meteorite from Moonbi, Tamworth, N.S.W., A., ii, 193.
- Minguin, Jules**, crystallographic properties of alkylcamphors of the aromatic series, A., i, 694.
- Minguin, Jules**. See also **Albin Haller**.
- Minovici, Stephen S.**, aromatic oxazoles and imidazoles, A., i, 703.
- Miolati, Arturo**, action of hydroxylamine hydrochloride on glyoxal, A., i, 276.
- stability of imides of dibasic acids, A., ii, 242.
- Miolati, Arturo**, and **E. Longo**, stability of substituted succinimides, A., ii, 242.
- Mitchell, Charles Ainsworth**, composition of human fat, A., ii, 570.
- Mitchell, W. L.** See **Horace Lemuel Wells**.
- Mittelmeier, Hans**, diastatic resolution of starch, A., i, 336.
- Mixer, C. T.**, and **H. W. Dubois**, Särnström's method of estimating manganese in iron ores, A., ii, 547.
- Mjöen, J. Alfred**, fatty oils of *Secale cornutum* and of the seeds of *Strophanthus hispidus* and *Hyoscyamus niger*, A., ii, 506.
- Möhlau, Richard**, 2 : 3-amidonaphthoic acid, A., i, 243.
- constitution of 2 : 3-hydroxynaphthoic acid and its derivatives, A., i, 243.
- Möhlau, Richard**, and **Felix Kriebel**, 1 : 2 : 3-dihydroxynaphthoic acid, A., 242.
- Möhlau, Richard**, and **Karl Uhlmann**, quinazine and oxazine colouring matters, A., i, 166.
- Moer, Joh. van de**, synthesis of cytisine, A., i, 657.
- Mörner, Karl Axel Hampus**, proteïds of normal urine, A., ii, 120.
- Moeser, Ludwig**, salts of ferric acid, A., ii, 250.
- Mohl, Emil**. See **Adolf Claus**.
- Moissan, Henri**, formation of gaseous and liquid hydrocarbons by the action of water on carbides, A., i, 633.
- varieties of graphite, A., ii, 165.
- action of silicon on iron, chromium, and silver, A., ii, 173.
- Moissan, Henri**, black carbonado from Brazil, A., ii, 182.
- graphite from a pegmatite, A., ii, 182.
- meteorites, A., ii, 194.
- poisonous effects of acetylene, A., ii, 200.
- presence of sodium in aluminium prepared by electrolysis, A., ii, 301.
- analysis of aluminium and its alloys, A., ii, 338.
- uranium carbide, A., ii, 364.
- lithium carbide, A., ii, 419.
- cerium carbide, A., ii, 422.
- manganese carbide, A., ii, 423.
- nickel and cobalt ~~carbides, borides~~ ^(See errata V. 742 p. 964), A., ii, 424.
- uranium, A., ii, 525.
- preparation of alloys, A., ii, 601.
- tungsten, A., ii, 606.
- vanadium and vanadium carbide, A., ii, 608.
- solubility of carbon in rhodium, iridium, and palladium, A., ii, 609.
- artificial production of diamonds, A., ii, 644.
- black diamonds, A., ii, 645.
- lanthanum carbide, A., ii, 650.
- Moissan, Henri**, and **Étard**, carbides of yttrium and thorium, A., ii, 422.
- Moissan, Henri**, and **Henri Gautier**, new method for the determination of the density of gases, A., ii, 294.
- Moissan, Henri**, and **Lengfeld**, a new zirconium carbide, A., ii, 428.
- Moissan, Henri**, and **Charles Moureu**, action of acetylene on iron, nickel, and cobalt reduced by hydrogen, A., i, 585.
- Molisch, Hans**, phycoeyanin, a crystallisable proteïd, A., i, 660.
- the mineral food of lower fungi, A., ii, 207.
- Monsacchi, U.** See **Hugo Schiff**.
- Montemartini, Clemente**, dimethyl-2 : 3-pentandioic acid ($\alpha\beta$ -dimethylglutaric acid), A., i, 667.
- Montesano, Giuseppe**. See **Claudio Fermi**.
- Moor, Cresacre George**. See **Thomas James Pearmain**.
- Moore, B.** See **Edward Albert Schäfer**.
- Moraczewska, Sophie von**, alterations in the blood in anæmia, A., ii, 618.
- Moraczewski, Wacław von**, estimation of hydrochloric acid in the gastric juice, A., ii, 671.
- Mordhorst, C.**, precipitation of urates within and without the body, A., ii, 491.
- Moreau**. See **Paul Cazeneuve**.

Morisot, new form of battery, A., ii, 4.
Morley, Edward W., density of oxygen, A., ii, 518.
 — the density of hydrogen, A., ii, 595.
 — atomic weights of oxygen and hydrogen, A., ii, 640.
Moro, Pietro, naphthalene-1 : 4-dicarboxylic acid and its derivatives, A., i, 567.
Morris, George Harris, analysis of beer, with some remarks on the unfermentable reducing residue, A., ii, 394.
Morris, George Harris. See *Horace T. Brown*.
Morse, Harmon Northrup, and *A. D. Chambers*, standardisation of potassium permanganate and sulphuric acid, A., ii, 388.
Morse, Harmon Northrup, Arthur John Hopkins, and *Milo S. Walker*, reduction of permanganic acid by manganese dioxide, A., ii, 475.
Moses, Alfred J., mineralogical notes [scapolite, &c.], A., ii, 661.
Moss, Richard J., a graphitic schist from County Donegal, A., ii, 108.
Mosse, Max, formation of sugar in the liver, A., ii, 617.
Mosso, Ugolino, sugar as a food, A., ii, 44.
 — effect of alkaloids on the germination of seeds, A., ii, 326.
Motteu. See *Lindemann*.
Moulin, L., a new test for asparagine, A., ii, 629.
Moureu, Charles, synthesis and constitution of eugenol, A., i, 215.
 — veratrylamine, A., i, 426.
 — safrole and isosafrole, A., i, 477.
 — two isomerides of anethoil, A., i, 646.
 — argon and helium in a mineral water, A., ii, 298.
Moureu, Charles. See also *Henri Moissan*.
Mourlot, A., crystallised anhydrous manganese sulphide, A., ii, 25.
 — crystallised chromous sulphide, A., ii, 304.
 — action of high temperatures on certain sulphides, A., ii, 603.
Mozdzyński, G. See *Wilhelm von Miller*.
Muckenfuss, Arthur M. See *Ira Remsen*.
Müller, Hermann, effect of abundant application of nitrogen on assimilation and respiration in plants, A., ii, 53.
 — physiology of yeast and the im-

portance of selected and pure cultures for wine fermentation, A., ii, 201.
Müller, H. C. See *W. Schneidewind*.
Müller Wilhelm, artificial hæmatite and magnetite, A., ii, 254.
Müller-Erzbach, Wilhelm, vapour tension of hydrated salts and the constitution of the combined water, A., ii, 295.
Münch, Gustav, hydroxylamidoisobutyric acid, A., i, 203.
Münzer, Egmund, and *P. Palma*, metabolism in poisoning by carbonic oxide and nitrobenzene, A., ii, 662.
Muhr, Felix, regularity in the decomposition of aromatic acids, A., i, 231.
Mulder, Eduard, derivatives of tartaric acid and parapyrvic acid, A., i, 281.
 — influence of sulphurous anhydride in coal gas flames on quantitative estimations, A., ii, 333.
Mulder, Eduard, and *J. Heringa*, silver peroxy-nitrate, A., ii, 561.
Munk, Immanuel, metabolism, A., ii, 43.
 — potassium thiocyanate in saliva, A., ii, 50.
Murmann, Ernst. See *Hugo Weidel*.
Murray, Thomas Smith. See *Francis Robert Japp*.
Muthmann, Wilhelm. See *A. Clever, W. Mawrow*.

N.

Nacken, W., chemical characteristics of bilberry juice, A., ii, 495.
Nahke, O. See *Albert Töhl*.
Namias, Rodolfo, protochemistry and thermophotochemistry, A., ii, 459.
Nanninga, A. W. See *Paul Jacobson*.
Nantier, A., rapid and exact estimation of lime in soils, A., ii, 545.
Nasini, Raffaele, argon, A., ii, 245.
Nasini, Raffaele and *Francesco Anderlini*, examination of terrestrial emanations for argon : gas from the thermæ of Abano, A., ii, 366.
Nasini, Raffaele, and *G. Gennari*, anomalous rotatory dispersion of malic acid, A., ii, 133, 285.
Nason, Frank L., limestones of Sussex Co., New Jersey, A., ii, 435.
Nasse, Otto, and *Friedrich Framm*, glycolysis, A., i, 398.
Nastukoff, measurement of the reducing power of pure yeasts, A., ii, 202.
Natterer, Konrad, saline soil and water from Persia, A., ii, 68.

- Naumann, Otto**, the tannin of fungi, A., ii, 538.
- Navarro, Lucas Fernández**, quiroguite, A., ii, 430.
- Nef, John Ulric**, bivalent carbon: chemistry of cyanogen and isocyanogen, A., i, 71.
- Nef, John Ulric**, and **L. W. Jones**, action of acid chlorides on the salts of the nitro-paraffins, A., i, 460.
- Negri, Giov. Battista**, identity of methylprotocotoin and methylhydrocotoin with the corresponding compounds obtained by Ciamician from leucotin, A., i, 655.
- Nencki, K.**, action of orthaldehydic acids on quinaldine in presence of zinc chloride, A., i, 256.
- Nencki, K.** See also **Augustin Bistrzycki**.
- Nepveu**, indican and indole in the tissues of tumours, A., ii, 319.
- Nernst, Walther**, and **Richard Abegg**, the freezing points of dilute solutions, A., ii, 292, 352.
- Neubauer, Hugo**, estimation of phosphoric acid by the molybdenum method, A., ii, 73.
- estimation of magnesia as magnesium pyrophosphate, A., ii, 674.
- Neumann, Albert**. See **Albrecht Carl Ludwig Martin Leonhard Kossel**.
- Neumann, B.** See **H. Nissenson**.
- Neumann, Sigismund**, water from the chalybeate spring of Óvári, A., ii, 615.
- Newth, George S.**, an apparatus for showing experiments with ozone, T., 1298: P., 1896, 139.
- note on the action of hydrofluoric acid on crystallised silicon, P., 1895, 176.
- Nicholls, A.** See **William Augustus Tilden**.
- Nicholson, Hudson H.**, and **S. Avery**, electrolytic estimation of iron, nickel, and zinc, A., ii, 627.
- Nicol, William Walker James**, the molecular volumes of organic substances in solution, T., 142; P., 1895, 237.
- Nicolaier Arthur**. See **Wilhelm Ebstein**.
- Niebel, W.** See **Emil Fischer**.
- Niederhofheim, Robert**. See **Martin Freund**.
- Niementowski, Stefan**, quinaclidine, A., i, 261.
- oxidation of quinazoline derivatives, A., i, 578.
- Niementowski, Stefan**, and **B. Orzechowski**, synthesis of quinoline derivatives from anthranilic acid and aldehydes, A., i, 187.
- Niemilowicz, Ladislaus**. See **Hugo Weidel**.
- Nietzki, Rudolf**, constitution of safranines, A., i, 580.
- Nietzki, Rudolf** [and, in part, **Karl Almenräder**, **Otto Baur**, and **Carl Simon**], amido-derivatives of diphenylamine and their relations to indamines and azines, A., i, 164.
- Nikitin**. See **Michael B. Konowaloff**.
- Nissenson, H.**, and **B. Neumann**, estimation of copper by precipitation with sodium thiosulphate, A., ii, 450.
- Nivière, G.**, and **A. Hubert**, detection of fluorine in wine, A., ii, 497.
- Noël-Paton, Diarmid**, relation of the liver to fats, A., ii, 316.
- Nordenskiöld, Nils Adolf Erik**, fluorine in apophyllite, A., ii, 369.
- Nordenskiöld, Olof Gustaf**, spodiosite from Nordmark, A., ii, 255.
- kentrolite from Jakobsberg, A., ii, 257.
- Norris, James F.** See **Ira Remsen**.
- Norris, R. S.**, and **F. G. Cottrel**, properties of liquid hydrogen iodide, A., ii, 357.
- Norwall**. See **Konek von Norwall**.
- Novák, Vladimir**, and **Ottoker Šulc**, absorption of Röntgen rays by chemical compounds, A., ii, 406.
- Noyes, Arthur Amos**, catalytic action of hydrogen ions in polymolecular reactions, A., ii, 470.
- Noyes, Arthur Amos**, and **John J. Dorrance**, electrolytic reduction of paranitro-compounds dissolved in sulphuric acid, A., i, 22.
- Noyes, Arthur Amos** and **Rolfe M. Ellis**, synthesis of bidiphenyl and its identification as benzerythrene, A., i, 51.
- Noyes, Arthur Amos**, and **William J. Hall**, velocity of hydrolysis of salicin by acids, A., ii, 159.
- Noyes, Arthur Amos**, and **Walter O. Scott**, the velocity law of polymolecular reactions, A., ii, 158.
- Noyes, Arthur Amos** and **Willard H. Watkins**, trimethylenic glycol as a bye product in the glycerol manufacture, A., i, 114.
- Noyes, William Albert**, camphoric acid, III., A., i, 695.
- Noyes, William Albert**, and **W. H. Blinks**, estimation of benzene in illuminating gas, A., ii, 128.

O.

- Oberlin, C., effect of carbon bisulphide on exhausted or "sick" (fatigués) soils, A., ii, 67.
- Oberreit, Erwin, preparation of diallyl-ethylic alcohol, A., i, 662.
- combination of hydrogen bromide with diallylacetic acid and diallyl-acetone, A., i, 666.
- Oddo, Giuseppe, and E. Manzella, Italian and other cements, A., ii, 246.
- — the setting of cements, A., ii, 246.
- Oddo, Giuseppe. See also Alberto Peratoner.
- Oechsner de Coninck, William, method of decomposition of some amides and imides, A., i, 282.
- decomposition of amides and basic compounds, A., i, 364.
- isomerism in the benzene series, A., i, 473.
- elimination of calcium compounds in rachitis, A., ii, 50.
- detection of creatinine in urine, A., ii, 132.
- Oehler, Eugen. See Adolf von Baeyer.
- Oelze, F. See Heinrich Beckurts.
- Oenslager, George. See Charles Loring Jackson.
- Oettel, Felix, electrolytic formation of hypochlorites and of chlorates, A., ii, 517.
- electrolysis of hydrogen chloride without a membrane, A., ii, 555.
- Oglobin, W. N., permanency of pigments on cotton fibre, A., i, 648.
- Oliver, George, a new hæmoglobino-meter, A., ii, 437.
- estimation of the number of blood corpuscles, A., ii, 437.
- Olivéro, Louis, essential oil of valerian (*Valeriana officinalis*), A., i, 492.
- Olszewski, Karl, determination of the critical and boiling temperatures of hydrogen, A., ii, 9.
- Omeliński, V., fermentation of cellulose, A., ii, 202.
- Oppelt, Eugen. See Stanislaus von Kostanecki.
- Opperman, G., estimation of sugar, A., ii, 278.
- Orloff, N. A., aconitic acid from *Adonis vernalis*, A., i, 136.
- chelidonium alkaloids, A., i, 396.
- tetraallylammonium, A., i, 634.
- Orndorff, William Ridgely and C. L. Bliss, dianthranol, A., i, 570.
- Orndorff, William Ridgely and Frank Kenneth Cameron, paranthracene or dianthracene, a polymeric modification of anthracene, A., i, 176.
- Orndorff, William Ridgely, and V. A. Howells, cis and trans-modifications of benzene hexabromide, A., i, 474.
- Orndorff, William Ridgely, and G. L. Terrasse, molecular weight of sulphur, A., ii, 357.
- Ortloff, W., eutropic series, A., ii, 355.
- Orzechowski, B. See Stefan Niementowski.
- Osborne, Thomas Burr, the chemical nature of diastase, A., i, 398.
- the proteïds of the rye kernel, A., ii, 399.
- proteïds of the kidney bean (*Phaseolus vulgaris*), A., i, 454.
- the proteïds of barley, A., i, 455.
- Osborne, Thomas Burr, and George F. Campbell, the proteïds of malt, A., i, 714.
- — the proteïds of the potato, A., i, 715.
- — legumin and other proteïds of the pea and vetch, A., i, 715.
- — conglutin and vitellin, A., i, 715.
- — chemical nature of diastase. II. A., i, 716.
- Osborne, Thomas Burr, and Clark G. Voorhees, proteïds of cotton seed, A., ii, 210.
- Osmond, Floris, tempering of very hard steel, A., ii, 172.
- Ossipoff, Iwan P., lecture experiment: combustion of oxygen in ammonia, A., ii, 356.
- Ost, Hermann, estimation of sugars by means of alkaline copper potassium carbonate, A., ii, 453.
- Ostrogovich, Adriano, methyldioxytriazine (acetoguanamide), A., i, 261, 393.
- acetylbiuret and benzoylbiuret, A., i, 530.
- Ostwald, Wilhelm, and Thor Mark, red and yellow mercuric oxides, A., ii, 142.
- O'Sullivan, Cornelius, and Arthur Landauer Stern, the identity of dextrose from different sources, with special reference to the cupric oxide reducing power, T., 1691; P. 1896, 218.
- O'Sullivan, James, hydrolysis and estimation of sugar, A., i, 334.
- Otto, R., effects of strychnine on plant development, A., ii, 211.
- amount of acid in rhubarb stems and in rhubarb wine, A., ii, 539.
- Otto, Robert, behaviour of stilbene dibromide and of tolane dibromide with sodium benzenesulphinic acid and sodium phenylmercaptide, A., i, 242.

Otto, *Robert*, behaviour of nareotine and papaverine in the Stass-Otto method of detecting alkaloïds, A., ii, 508.

Ouvrard, *Léon Victor René*. See *Louis Joseph Troost*.

P.

Paal, *Carl*, parahydroxybenzaldehyde, A., i, 49.

— 2 : 6-diphenylpyridine and piperidine, A., i, 389.

— deamidation of glutin-peptone, A., i, 455.

— glutinpeptones, A., i, 632.

Paal, *Carl*, and *Karl Demeler*, two isomeric bromodiphenaclys, A., i, 687.

Paal, *Carl*, and *Fritz Ganser*, action of phenylic isocyanate on amido-acids, A., i, 224.

Paal, *Carl*, and *H. Jänicke*, sulphamic acids of the aromatic series, A., i, 235.

Paal, *Carl*, and *Geo. Kromschröder*, derivatives of metadibromoparahydroxybenzaldehyde, A., i, 225.

Paal, *Carl*, and *Wilhelm Schilling*, action of alcoholic potash on gelatin and egg albumin, A., i, 399.

Packard, *R. L.*, a blue mineral, supposed to be ultramarine, from New Mexico, A., ii, 530.

Paderi, *Cesare*, physiological action of cadmium, A., ii, 491.

Pageot, *G.*, application of phosphates and superphosphates to acid soils, A., ii, 269.

Pagnoul, *Aimé*, assimilable nitrogen and its transformation in arable soil, A., ii, 66, 329.

Pailhade. See *Rey-Pailhade*.

Palache, *Charles*. See *F. Leslie Ransome*.

Pálffy, *Mór*, pyrrhotite from Borév, A., ii, 657.

Palma, *P.* See *Egmond Münzer*.

Palmaer, *Wilhelm*, iridioammonium compounds, A., ii, 179.

Palmer, *A. de Forest*, wave-length of the D₃ helium line, A., ii, 405.

Palmer, *Arthur William*, and *William C. Brenke*, symmetrical triamido-toluene, A., i, 539.

Parmentier, *F.*, bituminous mineral waters containing ammonia, A., ii, 195.

— solubility of sodium thiosulphate in alcohol, A., ii, 359.

Parry, *Ernest John*, santal wood oil, A., ii, 400.

Parry, *Ernest John*. See also *John Henry Coste*.

Parthiel, *Alfred*, estimation of glycerol in wine and beer, A., ii, 78.

Parthiel, *Alfred*, and *L. Spasski*, the alkaloïds of *Anagyris fœtida*, A., i, 657.

Paschen, *Friedr.* See *Carl Runge*.

Passerini, *Napoleone*, chlorine in rain water, A., ii, 69.

— action of sodium chloride and nitrate and of phosphates on the solubility of the potassium of the soil, A., ii, 330.

Passon, *Max*, comparative methods for estimating citrate-soluble phosphoric acid in basic slag, A., ii, 575.

— estimation of essential oil of mustard in feeding cakes, A., ii, 678.

Passon, *Max*. See also *F. Mach*.

Pasteur, *Louis*, telegram of condolence on the death of, P., 1895, 167.

Patein, *Gustave*, and *E. Dufau*, compounds of antipyrine [dimethylphenylpyrazolone] with dihydric phenols, A., i, 188.

— combination of antipyrine with the hydroxy^e lipoic acids and their derivatives, A., i, 650.

Paternò, *Emanuele*, eryscopic behaviour of substances having constitutions similar to that of the solvent, A., ii, 156.

Paterson, *David*, efflorescence of double ferrous aluminium sulphate on bricks exposed to sulphur dioxide, T., 66; P., 1895, 203.

Patterson, *Harry Jacob*, effect of different manures on the composition and combustibility of tobacco, A., ii, 211.

Patterson, *Thomas Stewart*, iodoso- and iodoxy-benzaldehydes, T., 1002; P., 1896, 153.

Pattinson, *John*, and *Hugh Salvin Pattinson*, estimation of phosphorus in iron and iron ores, A., ii, 389.

Paul, *Benjamin Horatio*, and *Alfred John Cownley*, chemistry of ipecacuanha, A., i, 192.

— action of heat on the alkaloïds of ipecacuanha, A., i, 395.

Pavy, *Frederick William*, sugar formation in the alcohol coagulated liver, A., ii, 665.

Pawlewski, *Bronislaw*, allofluoresceïn, A., i, 50.

Pearce, *Richard*, mode of occurrence of gold in the ores of the Cripple Creek district, A., ii, 612.

— Cripple Creek ores, A., ii, 613.

Pearmain, *Thomas Hames*, and *Cresacre George Moor*, composition and analysis of condensed milk, A., ii, 343.

- Pechmann, Hans von**, mixed amidines and tautomerism, A., i, 31.
 — diazomethanedisulphonic acid, A., i, 678.
- Pechmann, Hans von**, and **Philipp Manck**, action of sulphurous acid on potassium cyanide: diazomethanedisulphonic acid, A., i, 14.
- Pechmann, Hans von**, and **Ludwig Vanino**, action of benzoic chloride on urethane, A., i, 33.
- Peinemann, Karl**, pharmaceutical and chemical characteristics of cubebs and the piperonaceous fruits used in its adulteration, A., i, 494.
- Peipers**, estimation of carbon in iron, A., ii, 449.
- Peirce, A. W.**, gravimetric estimation of selenium, A., ii, 673.
- Peirce, A. W.** See also **Frank Austin Gooch**.
- Pekelharing, Cornelis Adrianus**, fibrin ferment and nucleo-proteid, A., ii, 488.
- Pélabon, H.**, formation of hydrogen selenide, A., ii, 96.
- Pellat, Henri**, vaporisation of metals at the ordinary temperature, A., ii, 601.
- Pemsel, Wilhelm**. See **Victor Meyer**.
- Penfield, Samuel Lewis**, separation of minerals of high specific gravity, A., ii, 216.
 — pearceite and the crystallisation of polybasite, A., ii, 658.
- Penfield, Samuel Lewis**, and **E. H. Forbes**, fayalite from Rockport, Mass., and the optical characters of the olivine group, A., ii, 373.
- Penfield, Samuel Lewis**, and **Julius Howard Pratt**, optical properties of lithiophilite and triphylite, A., ii, 184.
 — — thaumasite from West Paterson, New Jersey, A., ii, 367.
- Pennington, Mary Engle**, derivatives of niobium and tantalum, A., ii, 305.
 — [columbite from Wakefield, New Hampshire], A., ii, 303.
- Peratoner, Alberto**, and **Giuseppe Oddo**, decomposition of some trinitrides, A., ii, 215.
- Perkin, Arthur George**, luteolin. Part I. T., 206; P., 1896, 37. Part II. T., 799; P., 1896, 105.
 — acid compounds of natural colouring matters, T., 1439; P., 1896, 167.
- Perkin, Arthur George**, and **Hermann Bablich**, morin. Part I. T., 792; P., 1896, 106.
- Perkin, Arthur George**, and **Oswald Gunnell**, the colouring matter of *Querbracho Colorado*, T., 1303; P., 1896, 158.
- Perkin, Arthur George**, and **John James Hummel**, the colouring principle contained in the bark of *Myrica nagi*, T., 1287; P., 1896, 145.
 — — occurrence of quercetin in the outer skins of the bulb of the onion, T., 1295; P., 1896, 144.
 — — the colouring matters occurring in British plants, T., 1566; P., 1896, 185.
- Perkin, Arthur George**, and **George Young**, colouring matter of Sicilian sumach, *Rhus coriaria*, T., 1299; P., 1896, 157.
- Perkin, William Henry, sen.**, the influence of temperature on refractive power and on the refraction equivalents of acetylacetone and of ortho- and para-toluidine, T., 1; P., 1895, 199.
 — Hofmann Memorial Lecture: the origin of the coal-tar industry and the contributions of Hofmann and his pupils, T., 596; P., 1893, 137.
 — on magnetic rotatory power, especially of aromatic compounds, T., 1025; P., 1896, 122.
- Perkin, William Henry, jun.** (and in part **William Goodwin** and **Jocelyn Field Thorpe**), some derivatives of propionic acid, of acrylic acid, and of glutaric acid, T., 1457; P., 1896, 154, 170.
- Perkin, William Henry, jun.**, and **Jocelyn Field Thorpe**, the condensation of halogen derivatives of fatty ethereal salts with ketones and ketonic acids, P., 1896, 155.
- Perkin, William Henry, jun.** See also **William Arthur Bone**, **William Henry Bentley**, **Edward Haworth**, and **John Leathart Heinke**.
- Perrier, G.**, combination of aluminium chloride with phenols and their derivatives, A., i, 353.
- Perrier, Jean**, properties of Röntgen rays, A., ii, 347.
- Perrot, J. Louis**, decomposition of zinc chloride by water, A., ii, 561.
- Pescetta, Mosè**, specific rotation of α -nitrocamphor in various solvents, A., ii, 346.
- Pesci, Leone**, mercuroquinoline compounds, A., i, 186.
 — mercuropyridine compounds, A., i, 388.
- Peters, Franz**, action of lead and of potassium nitrite on lead nitrate, A., ii, 300.
- Petersen, Emil**, indirect etherification, A., ii, 638.

- Pethö, *Gyula*, chrysocolla in andesite-tuff, A., ii, 611.
- Petit, *Auguste*, and *P. Terrat*, estimation of caffeine in tea, A., ii, 629.
- Petrenko-Kritschenko, *Pavel Iw.*, steric hindrances to chemical reactions, A., i, 258.
- Petrenko-Kritschenko, *Pavel Iw.*, and *E. Arzibascheff*, influence of substitution on the course of some reactions, A., i, 671.
- Petrenko-Kritschenko, *Pavel Iw.*, and *S. Ephrussi*, influence of substitution on the course of the reactions of ketones, A., i, 135.
- Petrenko-Kritschenko, *Pavel Iw.*, *L. Pissarschewsky*, and *M. Herschkowitsch*, influence of substitution on the course of the reactions of ketones, A., i, 134.
- Petrenko-Kritschenko, *Pavel Iw.*, and *S. Stanischewsky*, condensation of aldehydes with ethylic acetone-dicarboxylate, A., i, 472.
- Pettersson, *Otto*, carbides of the metals of the rare earths, A., ii, 25.
- Pfeiffer, *Franz Wilhelm Theodor Christian*. See *K. Goetze*.
- Phelps, *C. S.* See *Charles D. Woods*.
- Phelps, *I. K.*, iodometric estimation of carbonic acid, A., ii, 673.
- Philips, *Arthur*, the pyridine series, A., i, 186.
- Phillips, *Francis C.*, possibility of the occurrence of hydrogen and methane in the atmosphere, A., ii, 162.
- the evolution method of the estimation of sulphur in white cast iron, A., ii, 498.
- Phinney, *J. I.* See *Charles Loring Jackson*.
- Phipson, *Thomas Lamb*, citric and tartaric acids from cane-sugar, A., i, 137.
- origin of atmospheric oxygen, A., ii, 265.
- new and abundant source of the oxides of thorium, cerium, yttrium, lanthanum, didymium, and zirconium, A., ii, 422.
- Piccini, *Augusto*, action of hydrogen peroxide on fluorides and oxyfluorides, A., ii, 178.
- alums of vanadium trioxide, A., ii, 304.
- alums of titanium sesquioxide, A., ii, 365.
- Pickard, *Robert Howson*. See *Percy Faraday Frankland*.
- Pickel, *J. M.*, lecture experiment: electrolysis of hydrochloric acid, A., ii, 557.
- Pickering, *John William*, action of drugs on the embryonic heart, A., ii, 46.
- Pickering, *John William*, physiology of the embryonic heart, A., ii, 663.
- blood coagulation in albinos, A., ii, 664.
- Pickering, *Spencer Percival Umfreville*, heats of combination of substances in the liquid and solid conditions, A., ii, 148.
- self recorded breaks in the properties of solutions, A., ii, 155.
- Pictet, *Amé*, and *A. Hubert*, synthesis of phenanthridine, A., i, 52.
- — new synthesis of phenanthridine bases, A., i, 483.
- — a remarkable formation of acridone, A., i, 503.
- Piloty, *Oscar*, oxidation of hydroxylamine by benzenesulphonic chloride, A., i, 555.
- Pinner, *Adolf*, existence of imidoethers derived from hydrocyanic acid, A., i, 9.
- Pinnow, *Johannes*, derivatives of dimethylparatoluidine, A., i, 161.
- Pinnow, *Johannes*, and *C. Sämann*, derivatives of orthamidobenzonitrile, A., i, 366.
- Pinnow, *Johannes*. See also *A. Schuster*.
- Pirsson, *Louis V.* See *Walter Harvey Weed*.
- Pisani, *Félix*, thaumasite, A., ii, 530.
- Pissarschewsky, *L.* See *Pavel Iw. Petrenko-Kritschenko*.
- Pitsch, *Otto*, and *J. von Haarst*, are nitrates indispensable for the growth of plants? A., ii, 212.
- Pittman, *Edward F.*, willyamite, a new mineral from Broken Hill, N.S.W., A., ii, 31.
- Piutti, *Arnaldo*, action of succinic acid on paramidophenol and its ethers, A., i, 223.
- action of iodine on imides and substituted imides, A., i, 364.
- formation of active β -asparagine, A., i, 668.
- Pizzi, *Augusto*, composition of the milk of various animals, A., ii, 120.
- Plancher, *Giuseppe*, action of phenylhydrazine on nitrosophenols, A., i, 358.
- Platania, *Gaetano*, xiphonite, a new amphibole [hornblende] from Etna, A., ii, 259.
- Platt, *C.* See *Arthur Bower Griffiths*.
- Playfair, *Lord*, Hofmann memorial lecture. Personal reminiscences of Hofmann, and of the conditions which led to the establishment of the

- Royal College of Chemistry, and his appointment as its professor, T., 575; P., 1893, 133.
- Plesconosoff, B. See *Sergius Reformatzky*.
- Plöchl, Josef. See *Wilhelm von Miller*.
- Plugge, Pieter Cornelis, identity of baptitoxine and eytisine, A., i, 67.
- matrine, the alkaloïd of *Sophora angustifolia*, A., i, 68.
- occurrence of eytisine in various *Papilionaceæ*, A., ii, 61.
- Pochin, Henry Davis, obituary notice of, T., 735.
- Podrajansky, L. See *Stanislaus von Kostanecki*.
- Pogge, W. See *Richard Stoermer*.
- Pollak, J. See *Oscar Hinsberg*.
- Pollard, William. See *Arthur Hutchinson*.
- Pommerehne, Herbert, alkaloïds of *Berberis aquifolium*, A., i, 66.
- Pond, F. J. See *Otto Wallach*.
- Ponsot, A., cryoscopic investigations, A., ii, 411.
- determination of the freezing point of dilute aqueous solutions, A., ii, 636.
- Ponzio, Giacomo, action of nitric acid on fatty aldehydes, A., i, 461.
- aliphatic thiocarbimides, A., i, 636.
- Pope, Frank G. See *John Theodore Hewitt*.
- Pope, William Jackson, substances exhibiting circular polarisation both in the amorphous and crystalline states, T., 971; P., 1896, 116.
- the refraction constants of crystalline salts, T., 1530; P., 1896, 177.
- polymorphism as an explanation of the thermochemical peculiarities of chloral and bromal hydrates, P., 1896, 142.
- a compound of camphoric acid with acetone, T., 1696; P., 1896, 217.
- Porchunoff, A. See *Nicolai D. Zelinsky*.
- Portmann, B. See *Carl Hell*.
- Postoéeff, J. J., automatic apparatus for filtration at high temperatures, A., ii, 516.
- Poulsson, C., polystichicic acids, A., i, 387.
- Praet, Julius Howard. See *Samuel Lewis Penfield*.
- Precht, J., modification of von Babo's water mercury pump for the production of high vacua, A., ii, 415.
- Pregl, Fritz, *Succus entericus* of sheep, A., ii, 49.
- Prentice, Bertram. See *Adolf von Baeyer*.
- Prescott, Albert B., pyridine alkyl-iodides, A., i, 316.
- Prescott, Albert B., and P. F. Trowbridge, pyridine periodides, A., i, 186.
- Prescott, Albert B. See also *R. E. Flintermann*.
- Preyer, W., place of argon and helium in the system of the elements, A., ii, 418.
- Prianischnikoff, Dm., the processes of germination, A., ii, 380.
- Procter, Henry Richardson, estimation of tanning matter, A., ii, 403.
- Procter, Henry Richardson. See *Carlton B. Heal*.
- Prosio, P. See *Robert Schiff*.
- Prost, Eugène. See *Lucien Louis de Koninck*.
- Proude, James, and William Henry Wood, experiments on the formation of the so-called ammonium amalgam, P., 1895, 236.
- Prud'homme, Maurice, synthesis of pararosanine and its di-, tri-, and tetra-alkyl derivatives, A., i, 306.
- acid rosanilines, A., i, 376.
- reduction of nitrotetramethyldiamidotriphenylmethane, A., i, 484.
- sulphonated colouring matters of the triphenylmethane series. "Patent blue," A., i, 485.
- Prunier, L. Léon A., preparation of sodium thioantimonate (Schlippe's salt), A., ii, 565.
- Pschorr, Robert, new synthesis of phenanthrene and its derivatives, A., i, 303.
- Pulfrich, Carl, a new refractometer, A., ii, 161.
- Purdie, Thomas, and Sidney Williamson, ethereal salts of optically active malic and lactic acids, T., 818; P., 1896, 96.
- Purgotti, Attilio, action of hydrazine hydrate on the ethyl derivatives of some nitrophenols: synthesis of 2:4:6-trinitromethoxyphenylhydrazine, A., i, 363.
- Puriewitsch, Konstantin A., assimilation of nitrogen by moulds, A., ii, 571.
- Py, analysis of fruit sugars, syrups, and preserves, A., ii, 342.

Q.

Quedenfeldt, E. See *Theodor Curtius*.

Quinan, W. R., physical aspects of argon: the ideal thermometrical substance for high temperatures, *A.*, ii, 407.

R.

Radenhausen, Rudolf, hydrazides of substituted amido-acids: fumarylhydrazide, *A.*, i, 137.

Radenhausen, Rudolf. See also *A. Struve*.

Raikow, P. N., detection of chlorine, bromine, and iodine, in organic compounds, *A.*, ii, 70.

Ramm, Eberh., feeding experiments with brushwood, *A.*, ii, 45.

Rammelsberg, Carl Friedrich, the leucite-nepheline group, *A.*, ii, 189.

Ramsay, William, a possible compound of argon, *A.*, ii, 20.

— helium, a gaseous constituent of certain minerals. Part II. Density, *A.*, ii, 595.

Ramsay, William, and **John Norman Collie**, homogeneity of argon and helium, *A.*, ii, 645.

Ramsay, William. See also *John Norman Collie*, *Alexander Kellas*, *Dorothy Marshall*, and *John William Strutt (Lord) Rayleigh*.

Randall, Wyatt W. See *J. P. Kuenen*.

Ransom, James H. See *Alexander Smith*.

Ransome, F. Leslie, and **Charles Palache**, lawsonite, a new rock-forming mineral from California, *A.*, ii, 370.

Rap, E., α -benzoylcoumarone, *A.*, i, 303.

Rapp, R., influence of oxygen on yeast fermentation, *A.*, ii, 668.

Ratz, Florian, dependence of the dielectric constant on temperature and pressure, *A.*, ii, 288.

Rauhm, Wilhelm. See *Victor Meyer*.

Raumer, Ed. von, and **Eduard Spaeth**, specific gravity of milk serum: estimation of lactose in milk, *A.*, ii, 394.

Rauter, Gustav, copper ferrocyanide, *A.*, i, 3.

Rây, Prafulla Chandra, mercurous nitrite, *A.*, ii, 649.

Rayleigh, John William Strutt (Lord), some physical properties of argon and helium, *A.*, ii, 598.

Rayleigh, John William Strutt (Lord), and **William Ramsay**, argon, a new constituent of the atmosphere, *A.*, ii, 99.

Raymann, Bohuslav, and **Ottokar Šulc**, levulose and humous substances derived from it, *A.*, i, 459.

Read, E. J., apparatus for the estimation of sulphur in iron, *A.*, ii, 274.

Rebière, G., estimation of alkali benzoates, *A.*, ii, 396.

Rebuffat, Orazio, guarinite, *A.*, ii, 309.

— analysis of emerald (?), *A.*, ii, 313.

— hydraulic cements, *A.*, ii, 360.

Recoura, Albert, chromium sulphate, *A.*, ii, 27.

Reformatsky, Alexandr A. See *Nicolai D. Zelinsky*.

Reformatsky, Sergius N., action of zinc and ethylic bromisobutyrate on isobutaldehyde: synthesis of secondary β -hydroxy acids, *A.*, i, 128.

— preparation of $\alpha\alpha$ -dimethylglutaric acid from the corresponding hydroxy-acid, *A.*, i, 206.

Reformatsky, Sergius N., and **B. Plesconossoff**, action of zinc and ethylic bromisobutyrate on acetone: synthesis of tetramethylenelactic acid, *A.*, i, 128.

Reibenschuh, Anton Franz, acid mineral waters from Radein, Styria, *A.*, ii, 435.

Reich, Alfred, synthesis of topaz, *A.*, ii, 531.

— [analysis of silicates containing fluorine], *A.*, ii, 544.

Reid, Edward Waymouth, intestinal absorption of peptone, *A.*, ii, 318.

— intestinal absorption, *A.*, ii, 663.

— estimation of oxygen in blood, *A.*, ii, 678.

Reid, Edward Waymouth, and **Frederick J. Hambly**, cutaneous respiration in the frog, *A.*, ii, 42.

Reinders, R. U. See *Heinrich Goldschmidt*.

Reissert, Arnold, action of ortho- and para-nitrobenzylic chlorides on ethylic sodiomalonate and like compounds, *A.*, i, 371.

— reactions of ethylic orthonitrobenzylmalonate. I. Alkaline hydrolysis: synthesis of indole derivatives, *A.*, i, 389.

— reactions of ethylic orthonitrobenzylmalonate. II. Reduction. Formation of quinoline derivatives, *A.*, i, 392.

Reitmair, Otto, citrate-soluble phosphoric acid, *A.*, ii, 575.

Reizenstein, Fritz, metallic salts with organic bases, *A.*, i, 316.

Remsen, Ira, K. N. Hartman, and **Arthur M. Muckenfuss**, action of phosphorus pentachloride on para-sulphaminebenzoic acid, *A.*, i, 372.

Remsen, Ira, and **Arthur M. Muc-**

- kenfuss, transformation of para-sulphaminebenzoic acid when heated, A., i, 481.
- Remsen, *Ira*, and *James F. Norris*, action of the halogens on the methylamines, A., i, 336.
- Remy, assimilation of the nutritive matter of the soil by rye. Manurial requirements of rye, A., ii, 670.
- Renard, *Adolphe*, ozotoluene, A., i, 149.
- Renard, *Alphonse François*, meteorite of Lesves, A., ii, 614.
- Renner, *W.* See *Emil Knoevenagel*.
- Retgers, *Jan Willem*, position of tellurium in the periodic system, A., ii, 520.
- Reverdin, *Frédéric*, iodine derivatives of anisole. Migration of an iodine atom, A., i, 475.
- Reverdin, *Frédéric*, and *Hugo Kauffmann*, substitution products of the carbonates and phosphates of α -naphthol and β -naphthol: preparation of 1:4-chloronaphthol and 1:4-bromonaphthol, A., i, 175.
- Revis, *Cecil*, and *Frederick Stanley Kipping*, derivatives of α -hydrindone, P., 1895, 214.
- — bromocamphor, P., 1896, 77.
- Rey, *J. G.*, excretion and absorption of lime, A., ii, 489.
- Reychler, *Albert*, action of trichloroacetic acid on terpenes, A., i, 308.
- isobornyl chloride and camphene hydrochloride, A., i, 313.
- camphene bromide, A., i, 381.
- [conversion of pinene into camphene], A., i, 620.
- Reychler, *Albert*. See *L. Masson*.
- Reynolds, *W. G.* See *Frank Austin Gooch*.
- Rey-Pailhade, *Joseph de*, philothion and lacease in germinating seeds, A., ii, 326.
- Richard, *Georges Adolphe*, colour photography: substitution of organic dyes for the reduced silver of photographic proofs, A., ii, 406.
- Richard, *Jules*. See *Th. Schloesing, jun.*
- Richards, *Ellen H.*, and *J. W. Ellms*, colouring matter of natural water: its source, composition, and estimation, A., ii, 340.
- Richards, *Joseph W.*, separation of silver from gold by volatilisation, A., ii, 674.
- Richards, *Percy Andrew Ellis*, action of mercury salts on aluminium, A., ii, 650.
- Richards, *Theodore William*, and *Elliot Folger Rogers*, determination of the atomic weight of zinc, A., ii, 21.
- Richardson, *Arthur*, and *Emily C. Fortey*, action of light on amyl alcohol, T., 1349; P., 1896, 164.
- — note on the action of light on ether, T., 1352; P., 1896, 165.
- Richardson, *Herbert Appleton*. See *Augustus H. Gill*.
- Richarz, *Franz*, and *Carl Lonnes*, convection currents, A., ii, 585.
- Richet, *Charles*, uropoietic diastase, A., ii, 119.
- Richmond, *Henry Droop*, volatility of fatty acids and laws deduced therefrom, A., ii, 280.
- Richmond, *Henry Droop*, and *L. Kidgell Boseley*, detection of formalin, A., ii, 583.
- Richter, preparation of crystalline bile acids and their relationship to colouring matters, A., i, 111.
- Richter, *M. M.*, a contribution to nomenclature, A., i, 349.
- Rideal, *Samuel*, and *Sigmund Georgjewitsch Rosenblum*, analysis of chrome-iron ore, ferrochromium, and chrome-steel, A., ii, 276.
- Riegler, *E.*, estimation of total solids and alcohol in wine by an optical method, A., ii, 224.
- estimation of uric acid by Fehling's solution, A., ii, 227.
- decomposition of silver oxide by means of hydrogen peroxide, A., ii, 471.
- standardisation of thiosulphate by iodine acid, A., ii, 573.
- volumetric estimation of soluble iodides, A., ii, 573.
- standardisation of permanganate, A., ii, 676.
- Rietsch, *Maximilien*, and *M. Heiselin*, fermentation by apiculated yeast: influence of aëration on fermentation by elliptical yeast at a high temperature, A., ii, 53.
- Rigollot, *H.*, action of the infra-red rays on silver sulphide, A., ii, 3.
- Rijn, *J. J. L. van*, new extraction apparatus, A., ii, 17.
- a modified condenser, A., ii, 91.
- Rimini, *Enrico*, dimethylglyoxime, A., i, 276.
- Rimini, *Enrico*. See also *Angelo Angeli*.
- Ringer, *Sydney*, antagonism between salts of calcium and those of sodium, potassium, and ammonium, A., ii, 49.
- Rinne, *Friedrich*, crystalline form of chemically simple substances, A., ii, 29.

- Rinne, Friedrich**, action of sulphuric and hydrochloric acids on heulandite: an artificial form of silica, A., ii, 368.
- Rising, Willard Bradley**, and **Victor Lenher**, electrolytic method for estimating mercury in cinnabar, A., ii, 338.
- Ritter, Gottfried von**, estimation of uric acid in urine, A., ii, 343.
- estimation of zinc in organic salts, A., ii, 578.
- Ritthausen, Carl Heinrich Leopold**, galactitol from yellow lupin seed, A., i, 405.
- water of crystallisation and reactions of alloxantin, A., i, 416.
- alloxantin as a decomposition product of convicin from sow-beans and vetches, A., i, 416, 668.
- vicin, a glucoside, A., i, 696.
- leucinimide, a product of hydrolysis of proteids with boiling acids, A., i, 716.
- Rivals, Paul**, thermochemistry of orthochlorobenzoic acid and some of its derivatives, A., ii, 409.
- thermochemistry of the amides and ammonium salts of some chloroacids, A., ii, 410.
- ethylic salts of the chloroacetic acids, A., ii, 588.
- acetal and chloroacetal, A., ii, 588.
- Rivière, G.**, and **Bailhache**, ethylic alcohol from the fermentation of *Asphodelus ramosus* and *Scilla maritima*, A., ii, 203.
- Rizzo, Niccolò**, anhydride and decomposition products of ethylic santonite, A., i, 307.
- Roberts-Austen, William Chandler**, diffusion of metals, A., ii, 590.
- note on Mr. W. J. Humphreys' paper on the solution and diffusion of certain metals in mercury, P., 1896, 219.
- Röhmman, Franz**, saline compounds of casein and their uses, A., i, 515.
- Röhmman, Franz**, and **J. Lappe**, the lactase of the small intestine, A., ii, 43.
- Rogers, Elliot Folger**. See **Theodore William Richards**.
- Rogóyski, K.**, and **Gustav Tammann**, adiabatic volume changes in solutions, A., ii, 513.
- Rohland, P.** See **Max Le Blanc**.
- Rohrer, R.**, haematite from Elba, A., ii, 431.
- Roithner, Ernst**. See **Hugo Weidel**.
- Roloff, Max**, method for the determination of the freezing points of concentrated solutions, A., ii, 291.
- Romburgh, Pieter van**, nitration of dimethylparatoluidine, A., i, 478.
- Romijn, Gysbert**, hydrated sodium salicylate, A., i, 550.
- detection of formaldehyde, A., ii, 280.
- estimation of dissolved oxygen, A., ii, 579.
- Roos, Ernst**, action of thyroiodin, A., ii, 488.
- Roos, Ernst**. See also **Eugen Baumann**.
- Rosdalsky, G.**, derivatives of piperazine, A., i, 257.
- Rosell, Claude A. O.**, the ferrates, A., ii, 175.
- Rosemann, Rudolf**, toxicity of acetylene, A., ii, 492.
- Rosenberg, M. von**. See **Julius Bredt**.
- Rosenblum, Sigmund Georgjewitsch**. See **Samuel Rideal**.
- Rosenheim, Arthur**, action of inorganic acidic metallic oxides on organic acids, A., i, 348.
- Rosenheim, Arthur** [and in part **Ludwig Cohn**], action of inorganic acidic metallic oxides on organic acids, A., i, 278.
- Rosenstiehl, Auguste**, ammoniacal derivatives of hexamethyltriamidotriphenylmethane, A., i, 376, 377.
- Rosbach, G.** See **Stanislaus von Kostanecki**.
- Rossel, Arnold**, combination of nitrogen with metals, A., ii, 299.
- diamonds from steel, A., ii, 601.
- Rossi, B.** See **Philippe A. Guye**.
- Roth, W.**, β -naphthylpiperidine and β -naphthyl-2-pipecoline, A., i, 497.
- Rothmund, Victor**, influence of pressure on reaction velocities, A., ii, 593.
- Rousset, L.**, action of ethyloxalic chloride [ethylic chloroglyoxylate] on naphthalene in presence of aluminium chloride, A., i, 652.
- Roussy**, resistance of invertin to heat, A., ii, 121.
- Rudsky, M.** See **Nicolai D. Zelinsky**.
- Rüdt, Hermann**. See **Paul Friedländer**.
- Rügheimer, Leopold**, hippuroflavin, A., i, 61.
- attempts to prepare optically active parahydroxymetamethylbenzoic acid, A., i, 616.
- Rügheimer, Leopold**, and **M. Hankel**, duroquinone and the action of amidobases on quinones, A., i, 677.
- — diduroquinone, A., i, 687.
- Ruhemann, Siegfried**, formation of pyrazolone derivatives from chlorofumaric acid, T., 1394; P., 1896, 166.

- Ruhemann, *Siegfried*, the pyrazolone series, A., i, 505.
- Ruhemann, *Siegfried*, and *E. A. Tyler*, contributions to the knowledge of ethylic acetoacetate. Part I, Acetonylmalic acid, T., 530; P., 1896, 73.
- Ruhemann, *Siegfried*, and *C. G. L. Wolf*, contributions to the knowledge of the β -ketonic acids, T., 1383; P., 1896, 166.
- Rumpf, *O.* See *R. F. Weinland*.
- Rumpf, *Theodor*, excretion of ammonia in disease, A., ii, 379, 618.
- Runge, *Carl*, and *Friedr. Paschen*, the constituents of the gas from clèvite, A., ii, 1.
- Runyan, *E. G.*, and *Harvey Washington Wiley*, estimation of small quantities of phosphoric acid by the citrate method, A., ii, 126.
- Ruoss, volumetric estimation of metals precipitable by alkalis; and application of the method, A., ii, 500.
- Rupe, *Hans*, asymmetrical α -phenylhydrazine compounds, A., i, 429.
- Rupe, *Hans*, and *Georg Heberlein*, asymmetrical phenylhydrazine derivatives, A., i, 363.
- Rupp, *Erwin*, perhalogenised phthalic acids and hexiodobenzene, A., i, 618.
- Ruppel, *W. G.* *Vernix caseosa*, A., ii, 199.

S.

- Sabatier, *Paul*, nitrosodisulphonic acid, A., ii, 599, 641.
- detection of nitrites by means of cuprous salts, A., ii, 622.
- Sämann, *C.* See *Johannes Pinnow*.
- Sakurai, *Jōji*, the molecular conductivity of amidosulphonic acid, T., 1654; P., 1896, 181.
- constitution of glycocine, P., 1896, 38.
- Salfeld, *August*, employment of quicklime in the cultivation of leguminosæ, A., ii, 332.
- Salkowski, *Ernst Leopold*, behaviour of casein towards pepsin-hydrochloric acid, A., i, 660.
- the sugar that forms in the auto-digestion of yeast, A., ii, 202.
- pentosuria, A., ii, 490.
- Salomon, *Fritz*, simple method of reducing weight in air to weight in a vacuum, A., ii, 640.
- Salomon, *Georg Anton*. See *Martin Krüger*.
- Salomon, *Wilhelm*, wernerite (dipyre) from Breno, Lombardy, A., ii, 433.

- Salomonson, *H. W.*, reactions of salts of alkaloids with various indicators, A., i, 450.
- Salvadori, *Roberto*, variation of electrolytic dissociation with temperature; freezing and boiling point determinations of aqueous and methyl alcoholic solutions of chlorides, A., ii, 512.
- Salzer, *Theodor*, water of crystallisation, A., ii, 415.
- Samietz, *E.* See *Heinrich Limpricht*.
- Saposchnikoff, *Wasily W.*, proteids and carbohydrates of green leaves as products of assimilation, A., ii, 537.
- Schäfer, *Edward Albert*, and *B. Moore*, extirpation of salivary glands, A., ii, 438.
- Schäfer, *J.* See *Heinrich Kiliani*.
- Schall, *Joh. Friedrich Carl*, γ -carbodi-phenylimide, A., i, 223, 305.
- decrease of conductivity when the water of solution is replaced by alcohol, A., ii, 463.
- Scharff, *Max*. See *Paul Duden*.
- Schaternikoff, *M.*, and *Iwan M. Setschenoff*, gas analysis, A., ii, 332.
- Schenck, *Friedrich*, muscular work and glycogen, A., ii, 48.
- Schenck, *Rudolf*, sulphur nitride, A., i, 426.
- Schertel, *Arnulf*, preparation of platinocyanides, A., i, 197.
- Scheurer-Kestner, *Auguste*, estimation of the acidity of some pyro-ligneous products, A., ii, 454.
- Schickendantz, *Federico*, analyses of Argentine minerals, A., ii, 480.
- Schickler, *P.*, a new hydrocarbon, $C_{14}H_{12}$, A., i, 490.
- Schiff, *Hugo*, biuret reactions, A., i, 281.
- optical activity of tannin, A., i, 370.
- benzylidenebiuret and allied compounds, A., i, 529.
- deamidoalbumin, A., i, 632.
- biuret compounds, A., i, 635.
- Schiff, *Hugo*, and *U. Monsacchi*, cyanuric acid from hydroxyoxamide, A., i, 209.
- Schiff, *Robert*, preparation of the oxime of ethylic acetoacetate and its derivatives, A., i, 83.
- Schiff, *Robert*, and *P. Prosio*, synthesis of pyridine derivatives by the action of ethylic acetoacetate on aldehydes in presence of ammonia, A., i, 250.
- Schiffer, *Th.* See *Karl Auwers*.
- Schilling, *Wilhelm*. See *Karl Paal*.
- Schjerning, *Niels Christian Henrik*, quantitative separation of proteids in beer wort, A., ii, 631.

- Schkolnik, *Grigori*. See *Paul Jacobson*.
- Schliebs, *G.* See *Ernst Beckmann*.
- Schlœsing, *Jean Jacques Théophile*, losses of nitrogen in waters of infiltration, A., ii, 69.
- nitric acid in the waters of the Seine and its chief tributaries, A., ii, 495.
- nitrates in potable waters, A., ii, 541.
- Schlœsing, *Th., jun.*, composition of marsh gas, A., i, 401.
- estimation of argon, A., ii, 166, 219.
- nitrogen and argon in fire-damp, A., ii, 655.
- Schlœsing, *Th., jun.*, and *Jules Richard*, detection of argon in the air-bladder of fishes and *Physalidæ*, A., ii, 436.
- Schlosser, *F.* See *Karl Auwers*.
- Schlundt, *Hermann*, chemical kinetics of oxidation. I. Speed of liberation of iodine in mixed solutions of potassium chlorate and hydrochloric acid, A., ii, 297.
- Schmelck, *Ludwig*, thorium and yttrium minerals of Norway, A., ii, 186.
- Schmidt, *Ernst Albert*, scopolamine, A., i, 712.
- Schmidt, *Gerhard Carl*. See *Ernst Eilhard Gustav Wiedemann*.
- Schmidt, *L.* See *Max Conrad*.
- Schmidt, *R.* See *Johann Carl Wilhelm Ferdinand Tiemann*.
- Schmidt, *Raymund*. See *Friedrich Carl Adolf Stohmann*.
- Schmidtman, *Hermann*, derivatives of malononitrile, A., i, 458.
- Schneegans, *August*, methylic salicylate and salicylic acid in the root of *Polygala* of Virginia, A., ii, 328.
- Schneider, *Bernhard von*, melting points of organic compounds, A., ii, 290.
- Schneider, *Edward Adolph*, analysis of prehnite from Fassa, Tyrol, A., ii, 38.
- Schneider, *Ernst Robert*, atomic weight of tungsten, A., ii, 428.
- Schneider, *M.* See *Stanislaus von Kostanecki*.
- Schneider, *Paul*, alkyl derivatives of ethylenediamine, A., i, 203.
- Schneider, *K.*, composition and constitution of eubanite (eupropyrite), A., ii, 253.
- Schneidewind, *W.* and *H. C. Müller*, the nutritive substances of beetroot, A., ii, 538.
- Schnell, *Ludwig*. See *Adolf Claus*.
- Schöndorff, *Bernhard*, estimation of urea in animal organs and liquids, A., ii, 131.
- Schöndorff, *Bernhard*, urea in animal organs, A., ii, 318.
- partition of urea between blood corpuscles and serum, A., ii, 375.
- Schönherr, *O.* See *Karl Elbs*.
- Schöpf, *Martin*, constitution of 2:3-hydroxynaphthoic acid, A., i, 243.
- Schoepp, *R. J. L.*, detection of salicylic acid in beer, A., ii, 227.
- Scholl, *Roland*, preparation of cyanogen bromide, bromonitromethane, and dibromonitromethane, A., i, 585.
- Scholl, *Roland*, and *Karl Landsteiner*, reduction of pseudonitroles to ketoximes, A., i, 198.
- Scholl, *Roland*, and *Georg Matthaiopoulos*, α -halogen ketoximes, A., i, 520.
- Scholtz, *Max*, semicarbazones, A., i, 343.
- derivatives of cinnamaldehyde, A., i, 368.
- bebirine, A., i, 710.
- Schoop, *Paul*, measurement of the electrochemical forces of accumulators, A., ii, 461.
- Schott, *Heinrich*, ethylic mono- and di-phenylacetylmalonate and the action of phenylhydrazine on ethereal salts of acidyl derivatives of malonic acid, A., i, 700.
- Schranz, *Wilhelm*. See *Paul Dobriner*.
- Schranzhofer, *Franz*. See *Guido Goldschmiedt*.
- Schraube, *C.*, and *M. Fritsch*, migration of the diazo-group, A., i, 221.
- Schreiber, *C.*, action of lime and magnesia on the soluble phosphoric acid of the soil, A., ii, 66.
- Schreiber, *C.* See *Smets*.
- Schröder von der Kolk, *J. L. C.*, double compounds of aniline and metallic salts, A., ii, 578.
- Schrötter, *Hugo*, albumoses, A., i, 112, 515.
- Schrötter-Kristelli, occurrence of carotene, A., ii, 208.
- Schütz, *O.*, and *Wilhelm Marckwald*, optically active valeric acid, A., i, 203.
- Schützenberger, *Paul*, and *O. Boudouard*, rare earths in monazite sands, A., ii, 475.
- Schuftan, *Adolf*, $\alpha\mu$ -dimethyloxazole, A., i, 262.
- Schulten, *August Benjamin (Baron) de*, reproduction of sodium magnesium chlorocarbonate, sodium magnesium carbonate, darapskite, and hydrargillite (gibbsite), A., ii, 610.

- Schultze, Otto W.** See *Arthur Rudolf Hantzsch*.
- Schulz, M., and Bernhard Tollens,** compounds of formaldehyde with polyhydric alcohols, A., i, 115.
- Schulze, Bernhard,** black Siberian lupins, A., ii, 211.
- pigeon manure, A., ii, 215.
- Schulze, Ernst,** the nitrogenous constituents of young green plants of *Vicia sativa*, A., ii, 208.
- occurrence of arginine in the tubers and roots of certain plants, A., ii, 383.
- nitrates in seedlings, A., ii, 494.
- occurrence of glutamine in plants, A., ii, 572.
- cell-wall of cotyledons of *Lupinus luteus*, and *Lupinus angustifolia*, A., ii, 618.
- Schulze, Ernst, and Ernst Winterstein,** a phosphorised constituent of plant seeds, A., i, 516.
- Schulze, Erwin,** classification of minerals according to the periodic system, A., ii, 566.
- Schulze, Julius,** chromates and dichromates of the heavy metals, A., ii, 24.
- Schunck, Edward, and Leo Marchlewski,** some derivatives of anthraquinone, T., 68; P., 1895, 202.
- — the red isomeride of indigo-tin: derivatives of isatin, A., i, 96.
- — chlorophyll. III, IV, V, A., i, 181, 496, 574.
- — isatin, A., i, 235.
- Schuster, A., and Johannes Pinnow,** derivatives of α -diamidodimethylaniline, A., i, 427.
- Schuyten, M. C.,** action of iodoform on β -naphthol in sunlight, A., i, 442.
- new derivatives of phenyldimethylpyrazolone, A., i, 575.
- estimation of iodine in organic liquids, A., ii, 71.
- volumetric estimation of antipyrine, A., ii, 456.
- action of nascent iodine on mercuric chloride, A., ii, 524.
- Schwabe, Carl.** See *Ludwig Wolff*.
- Schwager, Adolph, and C. Wilhelm von Gümbel,** analyses of Bavarian minerals, A., ii, 431.
- Schwarz, Carl.** See *Paul Jacobson*.
- Schweinitz, Emile Alexander von,** meteorite from Forsyth Co., North Carolina, A., ii, 375.
- Schweitzer, Hugo, and Emil E. Lungwitz,** the correct iodine number, A., ii, 398.
- Schweitzer, Hugo, and Emil E. Lungwitz,** commercial analysis of lard, A., ii, 399.
- — analysis of lard oil, A., ii, 399.
- — analysis of whale oil, A., ii, 399.
- — detection of soap in lubricants, A., ii, 400.
- — testing acetone, A., ii, 456.
- Scott, Walter O.** See *Arthur Amos Noyes*.
- Scoville, W. S.** See *Frank Austin Gooch*.
- Searle, Alfred B., and Arnold R. Tankard,** citric acid from cane sugar, A., i, 137.
- Sebelien, John,** effect of feeding cows with whale and herring meal, especially as regards milk production, A., ii, 197.
- Seegen, Josef,** muscular work and glycogen, A., ii, 487.
- Seeler, Felix.** See *Johannes Wislicenus*.
- Segalle, R.,** halogen substitution products of resacetophenone [2:4-dihydroxyacetophenone] and of its diethyl ether, A., i, 613.
- Séguy, Gaston,** tubular ozone generator, A., ii, 518.
- Seidel, Heinrich.** See *Ferdinand Ulzer*.
- Sell, William James,** studies on citrazinic acid. Part IV, T., 1447; P., 1896, 168.
- Semmler, Friedrich Wilhelm.** See *Johann Carl Wilhelm Ferdinand Tiemann*.
- Semple, William.** See *Arthur Rudolf Hantzsch*.
- Senderens, Jean Baptiste,** singular case of metallic precipitation, A., ii, 106.
- Seńkowski, Michael,** constitution of ehoic acid, A., i, 453.
- Senter H. A.** See *Karl Auwers*.
- Sestini, Fausto,** effect of adding alum to wine, A., ii, 342.
- Setschenoff, Iwan M.** See *M. Schaternikoff*.
- Setzer, Eugen.** See *Adolph Claus*.
- Shaw, George Elliott,** periodides of theobromine, T., 102; P., 1895, 177.
- Shaw, Hubert Grove,** water of crystallisation of barium picrate, A., i, 354.
- Sherman, H. C.,** estimation of nitrogen in fertilisers containing nitrates, A., ii, 125.
- Sherman, Penoyer L.** See *Alfred Einhorn*.
- Sherman, P. L., jun.** See *Paul C. Freer*.

- Sherzer, W. H.**, native sulphur in Michigan, A., ii, 182.
- Shields, John.** See *Rudolph Fittig*.
- Shimer, Porter W.**, estimation of graphite in pig-iron, A., ii, 499.
- Shukoff, A.**, new phenomenon in the formation of ethereal salts by the action of alcohol and hydrogen chloride on aromatic acids, A., i, 229.
- Sidersky, D.**, simultaneous estimation of organic and inorganic acidity in beetroot juice, A., ii, 397.
- Siegfried, Max A.**, phosphorearnic acid, A., i, 600.
- Sigmund, Wilhelm**, effect of chemical agents on germination, A., ii, 441.
- Silber, Paul G.** See *Giacomo Luigi Ciamician*.
- Silberstein, E.** See *Carl Arnold August Michaelis*.
- Simon, Carl.** See *Rudolf Nietzki*.
- Simon, Louis**, action of primary aromatic amines on unsymmetrical ketonic compounds, A., i, 85.
- Simonsen, E.**, production of alcohol from cellulose and wood, A., i, 331.
- Singhof, W.** See *Karl Auwers*.
- Sjögren, Sten Anders Hjalmar**, retzian, A., ii, 35.
- safflorite from Nordmark, Sweden, A., ii, 109.
- pyroaurite from Moss Mine, Nordmark, Sweden, A., ii, 110.
- fluid enclosures in gypsum, A., ii, 110.
- caryinite, A., ii, 112.
- soda-berzelite from Långban, A., ii, 113.
- långbanite from the Sjö Mine, Sweden, A., ii, 113.
- prolectite, a new mineral of the humite group, A., ii, 114.
- composition of chondrodite, humite and clinohumite from Nordmark, A., ii, 114.
- soda-richterite from Långban, Sweden, A., ii, 114.
- Sjöquist, John**, gastric digestion, A., ii, 484.
- estimation of free hydrochloric acid in gastric juice, A., ii, 496.
- Skey, William**, nature of stinkstone (anthraconite), A., ii, 184.
- Skinner, Sidney**, the Clark cell when producing a current, A., ii, 3.
- the tin-chromic chloride cell, A., ii, 3.
- Slosson, Edwin E.**, action of hypobromous and hypochlorous acids on acid anilides, A., i, 216.
- Slyke, Lucius L. van**, estimation of albumin in milk, A., ii, 132.
- Smale, Fred. J.**, solubility of uric acid in urine, A., ii, 490.
- Smetham, Alfred**, influence of oxide of iron and alumina on the reversion of superphosphate, A., ii, 364.
- Smets and C. Schreiber**, the potash and phosphoric acid required by cultivated plants, A., ii, 68, 384.
- Smith, Alexander** [and in part *James H. Ransom*], action of hydrazine and phenylhydrazine on 1:4-diketones, A., i, 322.
- Smith, Claud.** See *Charles Frederick Cross*.
- Smith, Edgar Francis**, and *Harry B. Harris*, action of phosphorus pentachloride on zirconium and thorium dioxides, A., ii, 179.
- — electrolytic estimation of ruthenium, A., ii, 223.
- Smith, Edgar Francis**, and *Joseph G. Hibbs*, action of gaseous hydrogen chloride on salts of the elements of the fifth group of the periodic system, A., ii, 164.
- Smith, Edgar Francis**, and *J. Merritt Matthews*, uranium oxynitride and uranium dioxide, A., ii, 177.
- Smith, Edgar Francis**, and *Frel. L. Meyer*, action of gaseous hydrogen chloride on the salts of the elements of the fifth group of the periodic system, A., ii, 164.
- Smith, Edgar Francis**, and *Daniel L. Wallace*, electrolytic separations, A., ii, 220.
- Smith, Edgar Francis.** See also *Elizabeth A. Atkinson*.
- Smith, Ernest A.**, gold and silver in copper and copper mattes, A., ii, 76.
- Smith, George**, silver minerals of the Australian Broken Hill Consols Mine, A., ii, 29.
- Smith, Harry M.**, estimation of formaldehyde, A., ii, 583.
- Smith, Henry George**, evansite from Tasmania, A., ii, 34.
- almandine garnet from the Hawkesbury sandstone, Sydney, N.S.W., A., ii, 38.
- Smith, R. Greig**, detection of sulphates, sulphites, and thiosulphates in presence of each other, A., ii, 71.
- Snape, Henry Lloyd**, on certain phenylthiocarbamates, T., 98; P., 1896, 12.
- action of diphenylene diisocyanate on amido-compounds, A., i, 241.
- replacement of chlorine in the chlorides of non-metals by bromine and iodine, A., ii, 641.
- Snyder, Harry**, composition of native and cultivated soils: effect of con-

- tinnous cultivation on their fertility, A., ii, 214.
- Soave, *Marco*, ricinin, A., i, 386.
- Soboleff, *M.*, physical properties of phosphododecatungstic acid, A., ii, 477.
- Soch, *C. A.* See *Charles Loring Jackson*.
- Soderi, *Mariano*, dinitramidothymol and dinitramidocarvacrol, A., i, 359.
- Söderbaum, *Henrik Gustav*, isomeride of hydroxydiphenylethylamine, A., i, 98.
- condensation products of hydroxydiphenylethylamine, A., i, 483.
- Söldner, *Friedrich*, and *William Camerer*, analysis of human milk, A., ii, 378.
- Sörenson, *S. P. L.*, preparation of some cobalti-compounds, A., i, 204.
- preparation of pure strontium compounds, A., ii, 360.
- Sohn, *Carl*. See *Victor Meyer*.
- Sokoloff, *Alexei P.*, electrolysis of water, A., ii, 510.
- Solberg, *E.*, composition of the milk fat of the cow, the goat, and the reindeer, A., ii, 378.
- Soldaini, *Arturo*, deliquescent alkaloïd from *Lupinus albus*, A., i, 193.
- extraction of alkaloïds from the seeds of *Lupinus albus*, A., i, 193.
- Sollas, *William Johnson*, crystalline form of riebeckite, A., ii, 310.
- Solonina, *Basil M.*, action of metallic sodium on phenylic γ -bromopropylic ether, A., i, 476.
- Soltmann, *Rudolf*, chemical behaviour of some naturally occurring titanium compounds, A., ii, 374.
- Sommer, *E. A.*, α - and β -cinnamene nitrosite, A., i, 294.
- Sommerfeld, *Paul*. See *Adolf Baginsky*.
- Sondheimer, *A.*, a compound containing a ring of 8 atoms, A., i, 505.
- Sondheimer, *A.* See also *Karl Auwers*.
- Sorel, *E.*, distillation of acids of the acetic series, A., i, 463.
- Sostegni, *Livio*, tannin colouring matters of red grapes, A., ii, 122.
- Sostegni, *Livio*. See *Berlese*.
- Source. See *Magnier de la Source*.
- Spaeth, *Eduard*, development of rancidity in fats, A., i, 664.
- analysis of soap, A., ii, 400.
- estimation of the acetyl numbers of lard, cotton-seed oil, and tallow, A., ii, 454.
- estimation of jalap resin in medicines: detection of strychnine in corpses, A., ii, 508.
- Spaeth, *Eduard*. See *Ed. von Raumer*.
- Spasski, *L.* See *Alfred Partheil*.
- Speier, *Arthur*, compounds of acetone with polyhydric alcohols, A., i, 77.
- Speier, *Arthur*. See also *Emil Fischer*.
- Speight, *R.*, olivine-andesite of Banks Peninsula, N.Z., A., ii, 192.
- Spencer, *John G.*, action of sodium hydroxide on allylmalonic, allylacetic, and ethylidenepropionic acids, A., i, 127.
- Speyers, *Clarence Livingstone*, heats of solution of some carbon compounds, A., ii, 410.
- Spezia, *Giorgio*, action of water on apophyllite, A., ii, 257.
- Spica, *Matteo*, volumetric estimation of copper, A., ii, 127.
- Spica, *Pietro*, toxicological estimation of phosphorus, A., ii, 218.
- Spieckermann, *A.*, constitution of behenoxylic and stearoxylic acids, A., i, 410.
- Spiegel, *Leopold*, isopropylic hydrogen sulphate, A., i, 332.
- preparation of glyoxal, A., i, 346.
- magnesium silver nitrite, A., ii, 360.
- Spiegel, *Leopold*, and *Carl Dobrin*, cardol, A., i, 653.
- Spilker, *Adolf*. See *Gustav Kraemer*.
- Spivey, *W. T. Newton*. See *Thomas Barlow Wood*.
- Spizzichino, *Enrico*, and *Carlo Conti*, preparation of valeranilide using phosphorus trichloride, A., i, 432.
- Spring, *Walther*, the colour of the alcohols compared with that of water, A., i, 634.
- decomposition of hydrogen peroxide, A., ii, 92.
- a hydrate of arsenic trisulphide and its decomposition by pressure, A., ii, 97.
- physical alteration of certain sulphur compounds at temperatures below their melting points, A., ii, 290.
- influence of time on the welding of pressed chalk, A., ii, 300.
- Staats, *Georg*, the yellow colouring matter of autumn leaves, A., i, 181.
- Stackelberg, *Ed. von*, heat of dissolution of sodium chloride, A., ii, 589.
- influence of pressure on solubility, A., ii, 637.
- Staedel, *Wilhelm*, synthesis of diphenylene ketone, and its derivatives, A., i, 374.
- Stahl, *Karl F.*, volumetric estimation of hydrofluoric acid, A., ii, 621.

- Stange, *Martin*, metallic compounds of triphosphoric acid, A., ii, 643.
- Stanger, *W. Harry* and *Bertram Blount*, testing of hydraulic cement, A., ii, 392.
- Stanischewsky, *S.* See *Pavel Iw. Petrenko-Kritschenko*.
- Stanojević, *A.*, analyses of magnesite, dolomite, mica, and magnetite from Servia, A., ii, 254.
- Starling, *Ernest Henry*, intravascular injection of peptone, A., ii, 197.
- absorption of fluids from connective tissue spaces, A., ii, 438.
- Staudenmaier, *Ludwig*, tellurium, A., ii, 96.
- Stavenhagen, *Alfred*, and *E. Engels*, molybdenum bronzes, A., ii, 28.
- Stead, *John Edward*, chromium estimations, A., ii, 221.
- estimation of arsenic in iron ores, steel, and pig iron, A., ii, 390.
- Steiger, *George*, water from Nashville, Illinois, and from the Soap Lake, Washington, A., ii, 194.
- Stelzner, *Robert*. See *Siegmund Gabriel*.
- Stephens, *F. R.* See *William Henry Symons*.
- Stern, *Alfred*. See *Max Busch*.
- Stern, *Arthur Landauer*, estimation of the extract of malt, A., ii, 396.
- Stern, *Arthur Landauer*. See also *Cornelius O'Sullivan*.
- Stevenson, *Henry E.* See *John Theodore Hewitt*.
- Stewart, *George Neil*, circulation time, A., ii, 48.
- Stickney, *Delia*, reduction of copper sulphides, A., ii, 523.
- Stieglitz, *Julius*. See *Felix Lengfeld*.
- Stift, *A.*, estimation of pentoses and pentosans in diffusion cuttings, sugar beet, and some food stuffs, A., ii, 79.
- estimation of pentoses and pentosans by means of the furfuraldehyde reaction, A., ii, 453.
- composition of the pollen of the sugar beet flowers, A., ii, 541.
- Stift, *A.* See also *Friedrich Strohmer*.
- Stillman, *John Maxson*, and *Minnie B. Yoder*, combination of anhydrous ammonia with aluminium chloride, A., ii, 301.
- Stindt, *H.* See *Carl Graebe*.
- Stobbe, *Hans*, condensation of simple ketones with ethylic succinate, and with ethylic pyrotartrate in the presence of sodium ethoxide, A., i, 234.
- Stock, *Aug.* See *Ernst Beckmann*.
- Stockman, *Ralph*, iron in food, A., ii, 43.
- experimental anæmia in dogs, A., ii, 264.
- iron in the liver and spleen, A., ii, 438.
- Stoehr, *Carl*. See *P. Brandes*.
- Stoermer, *Richard*, and *Victor von Lepel*, mixed aliphatic secondary amines, A., i, 663.
- Stoermer, *Richard*, and *W. Pogge*, disubstituted amidoacetones, A., i, 408.
- Stohmann, *Friedrich Carl Adolf*, and *Raymund Schmidt*, thermochemistry of hippuric acid, of its homologues, and of anisuric acid, A., ii, 466.
- Stoklasa, *Julius*, assimilation of elementary nitrogen by plants, A., ii, 203.
- assimilation of lecithin in plants, A., ii, 266.
- the position of arsenic in plant production, A., ii, 538.
- Stokvis, *Barend Joseph*, sugar as a food, A., ii, 44.
- hæmatoporphyrinuria, A., ii, 537.
- Štolba, *Franz*, native gold from Eule, Bohemia, A., ii, 429.
- limestone from Koněprus, Bohemia, A., ii, 435.
- Stolz, *Friedrich*, Marcourt's "formopyrine," i, 628.
- Stone, *George C.*, volumetric estimation of zinc and a new indicator for ferrocyanides, A., ii, 126.
- volumetric estimation of manganese, A., ii, 547.
- Storch, *Ludwig*, the dilution law of electrolytes, A., ii, 288.
- course of chemical reactions in gases, A., ii, 296.
- Stortenbeker, *Willem*, solubility of mixed crystals, A., ii, 13.
- Stracciati, *Enrico*. See *Adolfo Bartoli*.
- Strange, *E. H.* See *Harold Bailey Dixon*.
- Streatfeild, *Frederick William*. See *Raphael Meldola*.
- Streintz, *Franz*, polarisation and resistance of a galvanic cell, A., ii, 460.
- Strohl, *A.*, iodine number and refractive index of cacao butter, A., ii, 506.
- Strohmer, *Friedrich, H. Briem*, and *A. Stift*, nutrition and formation of substance in sugar beet in the second year of growth, ii, 538.
- Strohmer, *Friedrich*, and *A. Stift*, estimation of crystallisable sugar in raw sugars, A., ii, 505.
- Strupler, *A.* See *Oscar Hinsberg*.

- Strutz, A.** See *Friedrich Krafft*.
- Struve, A., and Rudolf Radenhausen,** azides (azoimides) of substituted benzoic acids, A., i, 35.
- Stutzer, Albert,** estimation of gelatin in meat extracts and commercial peptones, A., ii, 84.
- chemical examination of cheese, A., ii, 683.
- Stutzer, Albert, and R. Maul,** estimation of fusel oil in refined alcohol, A., ii, 504.
- Stutzer, Albert.** See also *R. Burri, E. Herfeldt*.
- Subak, J.** See *Alfred Werner*.
- Suida, Wilhelm.** See *Julius Mauthner*.
- Šulc, Ottokar,** electrolytic silver peroxide, A., ii, 521.
- Šulc, Ottokar.** See also *Bohuslav Raýmann, Vladimír Novák*.
- Sutherland, William,** fundamental atomic laws of thermochemistry, ii, 7.
- Svoboda, Hanno,** behaviour of basic lead acetate towards sugar solutions, A., i, 406.
- Symons, William Henry, and F. R. Stephens,** carbon dioxide: its volumetric determination, T., 869; P., 1896, 103.
- Szarvasy, Emerich,** the compounds of arsenic with selenium and of arsenic, selenium, and sulphur, A., ii, 98.
- Szenic, Wl., and R. Taggesell,** derivatives of β -chlorocrotonic acid, A., i, 81.
- Szyfer, L.,** estimation of lime by an alcoholic solution of potash soap, A., ii, 499.

T.

- Tacke, Bruno, and others,** behaviour of the leguminous nodule bacteria towards caustic lime, A., ii, 439.
- Täuber, Ernst,** diorthodiamidodiphenyl, A., i, 686.
- Täuber, Ernst, and Franz Walder,** γ -amidonaphtholsulphonic acid, A., i, 692.
- Tafel, Julius,** indirect etherification, A., ii, 470.
- Taggesell, R.** See *Wl. Szenic*.
- Tambor, Josef.** See *Stanislaus von Kostanecki*.
- Tammann, Gustav,** influence of pressure on the electrical conductivity of solutions, A., ii, 6.
- dependence of the volume of solutions on pressure, A., ii, 13.
- action of unorganised ferments, A., ii, 243.
- Tammann, Gustav,** specific heats of solutions, A., ii, 289.
- action of the kidney in the light of the theory of osmotic pressure, A., ii, 618.
- Tammann, Gustav.** See also *K. Rogóyski*.
- Tanatar, Simeon M.,** conversion of trimethylene into propylene, A., i, 457.
- hydroxylamine fumarate and its products of decomposition, A., i, 520.
- hyponitrous acid, A., ii, 417.
- formation of sodium carbonate in nature, A., ii, 419.
- heats of solution and neutralisation of nitrocarbamide, A., ii, 466.
- Tangl, F.,** influence of the vaso-motor nervous system on metabolism, A., ii, 43.
- Tangl, F., and Vaughan Harley,** physiology of blood sugar, A., ii, 47.
- Tankard, Arnold R.** See *Alfred B. Searle*.
- Tanret, Charles,** multirotation of reducing sugars and isodulcitol, A., i, 331.
- Tardy.** See *Georges Bouchardat*.
- Tarr, Ralph S.** See *T. E. Wolff*.
- Tarugi, N.,** behaviour of thioacetic acid with salt solutions, A., i, 125.
- detection of chromates and arsenites, A., ii, 340, 548.
- exclusion of ammonium sulphide from qualitative analysis, A., ii, 391.
- Tassilly, strontium and calcium iodides,** A., ii, 350.
- zinc oxyiodides, A., ii, 362.
- thermochemistry of oxybromides and oxychlorides of the calcium group, A., ii, 465.
- Taverne, H. J.** See *Antoine Paul Nicolas Franchimont*.
- Tcherniac, Joseph,** preparation of cyanogen bromide, A., i, 661.
- Tchitchibabin, A. E.,** hydrogenation of normal propylbenzene: pentabromopropylbenzenes, A., i, 351.
- Teall, J. J. Harris, and John Horne,** borolanite, a new igneous rock, A., ii, 117.
- Teall, J. J. Harris.** See also *Sir Archibald Geikie*.
- Teclu, Nicolae,** estimation of the velocity of chemical attraction, A., ii, 14.
- Teichmann, Hermann.** See *Carl Häussermann*.
- Terrasse, G. L.** See *William Ridgeley Orndorff*.
- Terrat, P.** See *Auguste Petit*.
- Tessarín.** See *Zanninovich-Tessarín*.

- Thaddéeff, Koustantin**, the olivine group, A., ii, 372.
- Than, Carl von**, a compensation method in gasometry, A., ii, 621.
- Thiele, Edmund**. See *Ludwig Vanino*.
- Thiele, Hermann**. See *Walther Hempel*.
- Thiele, Johannes**, phenylazocarboxylamide and phenylazocarboxylic acid, A., i, 94.
- heating apparatus for drying ovens, A., ii, 91.
- Thiele, Johannes**, and **Carl Heuser**, preparation of semicarbazide, A., i, 208.
- — hydrazine derivatives of isobutyric acid, A., i, 340.
- Thiele, Johannes**, and **Harry Ingle**, tetrazole derivatives, A., i, 107.
- Thiele, Johannes**, and **Arthur Lachman**, nitrocarbamide, nitrourethane, and nitramide, A., i, 207.
- Thiele, Johannes**, and **Carl Meyer**, reduction of methylnitramine and ethylnitramine, A., i, 407.
- Thomas, G. L.**, and **Sydney Young**, normal hexane from light petroleum (petroleum ether), P., 1895, 173.
- Thomas, Victor**, compounds of ferrous chloride and nitric oxide, A., ii, 26.
- action of nitric peroxide on stannic salts, A., ii, 365.
- action of nitric peroxide and air on bismuth chloride, A., ii, 429, 527.
- action of iodine on stannous chloride, A., ii, 608.
- action of nitric peroxide on antimony trichloride, A., ii, 609.
- Thomsen, Hans Peter Jürgen Julius**, the colour of the ions as a function of the atomic weight, A., ii, 16.
- supposed group of inactive elements, A., ii, 16.
- ratio of the atomic weights of oxygen and hydrogen, A., ii, 244.
- density of hydrogen and of oxygen, A., ii, 471.
- Thorpe, Albert**, analysis of monazite, A., ii, 34.
- analyses of leucite-basalt from Vesuvius, A., ii, 41.
- Thorpe, Jocelyn Field**. See *William Henry Bentley, William Henry Perkin, jun.*
- Thudichum, John Louis William**, phrenosin an immediate educt from the brain and the products of its chemolysis, A., i, 400.
- reaction of bilirubin with iodine and chloroform, A., i, 516.
- Tickle, Thomas**. See *Wyndham Rowland Dunstan*.
- Tiemann, Johann Carl Wilhelm Ferdinand**, the terpenes and camphor, A., i, 248.
- the pinene problem, A., i, 381.
- Tiemann, Johann Carl Wilhelm Ferdinand**, and **Paul Krüger**, method of purifying alcohols, A., i, 382.
- — two oxygenated bases from citronellaldoxime, A., i, 384.
- Tiemann, Johann Carl Wilhelm Ferdinand**, and **R. Schmidt**, homolinalol, A., i, 271.
- — compounds of the citronellal series, A., i, 382.
- Tiemann, Johann Carl Wilhelm Ferdinand**, and **Friedrich Wilhelm Semmler**, pinonic acid, A., i, 308.
- Tiemann, Johann Carl Wilhelm Ferdinand**. See also *Friedrich Mahla*.
- Tikhvinsky, M.** See *Friedrich Kehrman*.
- Tilden, William Augustus**, the action of bromine on pinene with reference to the question of its constitution, T., 1009; P., 1896, 137.
- an attempt to determine the condition in which helium and the associated gases exist in minerals, A., ii, 655.
- Tilden, William Augustus**, and **Robert E. Barnett**, the molecular weight and formula of phosphoric anhydride and of metaphosphoric acid, T., 154; P., 1896, 30, discussion, *ibid.*, 30.
- Tilden, William Augustus**, and **A. Nicholls**, preliminary note on some product from pinene tetrabromide, P., 1896, 138.
- Tillie, Joseph**. See *Thomas Richard Fraser*.
- Tingle, John Bishop**. See *Ludwig Claisen*.
- Tirmann, Johannes**, absorption of iron by the organism, A., ii, 487.
- Tissot, George**. See *Arthur Michael*.
- Titherley, A. W.** See *Karl Auwers*.
- Töhl, Albert**, synthesis of aromatic hydrocarbons, A., i, 16.
- Töhl, Albert**, and **O. Nahke**, dithienylphenylmethane and its nitro-derivatives, A., i, 690.
- Toepler, Max**, gas and vapour density determinations by means of a pressure balance, A., ii, 235.
- Tollens, Bernhard**, constitution of pectin substances, A., i, 7.
- oxycellulose, i, 7.
- detection of pentoses by precipitation with phloroglucinol, A., ii, 504.
- estimation of pentoses and pent-

- osans by the furfuraldehyde method, A., ii, 580.
- Tollens, *Bernhard*. See also *M. Apel*, *W. Henneberg*, *F. Mann*, *M. Schulz*, *R. W. Tromp de Haas*.
- Tolloczko, *St.*, constitution of menthene and its products of oxidation, A., i, 381.
- influence of chemical affinity on solubility, A., ii, 636.
- the lowering of solubility, A., ii, 636.
- Tomes, *Charles S.*, chemical composition of enamel, A., ii, 315.
- Tommasi, *Donato*, new electrolytic apparatus, A., ii, 511.
- desilverisation of lead by electrolysis, A., ii, 603.
- Topin, *J.*, new salts of amides, A., i, 282.
- Torray, *Joseph*. See *Henry Barker Hill*.
- Torrico y Meca, vanadiferous coal from Peru, A., ii, 252.
- Tower, *Olin Freeman*, peroxide electrodes, A., ii, 142.
- potential differences at the surface of contact of dilute solutions, A., ii, 586.
- Traube, *Hermann*, inglesiasite, tarnowitzite, and hemimorphite from Silesia, A., ii, 255.
- optical rotatory power of substances in the crystalline and liquid states, A., ii, 509.
- microchemical reactions [of barium and silver], A., ii, 578.
- Traube, *Isidor*, racemism. XIV, A., i, 526.
- tautomerism of ethylic acetate, A., i, 593.
- molecular volumes, A., ii, 152.
- molecular volumetric method of determining the molecular weight. I, II, III, A., ii, 153, 411.
- extension of the laws of Gay Lussac and Avogadro to homogeneous liquids and solid substances, A., ii, 235.
- molecular solution volumes and molecular volumes of organic compounds, A., ii, 354.
- Traube, *Wilhelm*, constitution of the isonitramines, A., i, 9.
- new method of preparing aliphatic diazo-compounds, A., i, 337.
- Traube, *Wilhelm*, and *G. G. Longinescu*, hydrazido-acids, A., i, 340.
- Traub, *Melchior*, hydrocyanic acid in *Pangium edule*, A., ii, 327.
- Trey, *Heinrich*, the birotation of glucose, A., ii, 139.
- Trillat, *Auguste*, preparation of fatty amines, A., i, 407.
- Troeger, *Julius*, and *K. Artmann*, unsaturated sulphones of the naphthalene series, A., i, 569.
- Troeger, *Julius*, and *A. Eggert*, action of thiophenol [phenylic hydro-sulphide] on aromatic diketones, A., i, 562.
- Tromp de Haas, *R. W.*, and *Bernhard Tollens*, oxycellulose, A., i, 6.
- — pectin substances, A., i, 7.
- — coco-nut shells, A., ii, 64.
- Troost, *Louis J.*, and *Léon Victor René Ouvrard*, combination of magnesium with argon and with helium, A., ii, 99.
- — origin of the argon and helium in the gas from sulphuretted waters, A., ii, 298.
- Trouvé, *Gustave*, acetylene as an illuminating agent, A., i, 633.
- Trowbridge, *P. F.* See *Albert B. Prescott*.
- Tschermak, *Gustav*, emery from Naxos, A., ii, 253.
- Tschernoswitoff, *N.* See *Nicolai D. Zelinsky*.
- Tschirsch, *William Oswald Alexander*, chlorophyll, A., i, 624.
- toxicity of copper salts, A., ii, 328.
- Tschitschkin. See *Michael Konowaloff*.
- Tschugéeff, *L.* See *Nicolai D. Zelinsky*.
- Tsuji, *C.*, mannan as human food, A., ii, 44.
- Tutton, *John Edgar*, connection between the atomic weight of contained metals and the crystallographical characters of isomorphous salts. The volume and optical relationships of the potassium, rubidium, and caesium salts of the monoclinic series of double sulphates,

$$R_2M(SO_4)_2 \cdot 6H_2O,$$
T., 344; P., 1896, 68.
- comparison of the results of the investigations of the simple and double sulphates containing potassium, rubidium, and caesium, and general deductions therefrom concerning the influence of atomic weight on crystal character, T., 495; P., 1896, 71.
- the bearing of the results of the investigations of simple and double sulphates containing potassium, rubidium, and caesium on the nature of the structural unit, T., 507; P., 1896, 71.
- Tyler, *E. A.* See *Siegfried Ruhemann*.

U.

- Uhlmann, *Karl*. See *Richard Möhlau*.
- Ulbricht, value of bone phosphates, A., ii, 68.
- Ullmann, *F.*, reduction of orthobenzoylbenzoic acid, A., i, 563.
- ortho-halogen derivatives of nitrobenzene and orthamidophenylic ethers, A., i, 605.
- Ullmann, *F.* See also *Carl Graebe*.
- Ulrich, *Christoph*, Lintner's isomaltose, A., i, 335.
- Ulzer, *Ferdinand*, and *Heinrich Seidel*, analysis of wool-grease, A., ii, 628.
- Umber, *F.*, influence of food containing nucleïn on the formation of uric acid, A., ii, 666.
- Umney, *John C.*, oil of Scotch fir (*Pinus sylvestris*) and other pine oils, A., i, 380.
- estimation of aconitine, A., ii, 283.
- Unger, *Oskar*, and *Karl A. Hofmann*, thiodiphenylamine, A., i, 535.
- Urbain, *G.*, condensation products of isobutaldehyde, A., i, 590.
- Ussing, *N. V.*, minerals of the nepheline-syenite of Greenland, A., ii, 372.

V.

- Vahlen, *E.*, specific rotation of cholic acid, choleic acid, and deoxycholic acid, A., i, 453.
- Vaillant, *Victor*, action of carbonyl chloride on dithioacetylacetone, A., i, 591.
- Valenta, *A.* See *Josef Maria Eder*.
- Valenta, *Eduard*. See *Josef Maria Eder*.
- Valentin, *Victor*, $\alpha\beta$ -trihalogenbutyric acids from the geometrically isomeric α -halogenacetic acids, A., i, 79.
- Vandenberghe, *Ad.*, molybdenum dihydroxychloride, A., ii, 27.
- preparation of pure molybdenum, A., ii, 427.
- action of certain gases on heated molybdenum, A., ii, 428.
- Vanino, *Ludwig*, and *Edmund Thiele*, acid peroxides and their action on reducing substances, A., i, 597.
- Vanino, *Ludwig*. See *Hans von Pechmann*.
- Varet, *Raoul*, compounds of mercuric cyanide with metallic chlorides, A., i, ?.

- Varet, *Raoul*, double decompositions between mercuric cyanide and salts of alkali and alkaline-earth metals, A., i, 113.
- double cyanides, A., i, 633.
- combination of mercuric cyanide with bromides, A., ii, 88.
- combination of mercuric cyanide with iodides, A., ii, 148.
- lithium, magnesium, and copper cyanides, A., ii, 149.
- thermochemistry of nickel cyanide, A., ii, 513.
- mercuric oxy-salts, A., ii, 648.
- Vaubel, *Wilhelm*, rules controlling the formation of azo-colouring matters, A., i, 28.
- action of nascent bromine on benzene derivatives, A., i, 147.
- a correction [bromination of acetanilide and acetoparatoluidide], A., i, 157.
- the benzene nucleus, A., i, 213, 352, 646.
- connection between colour and constitution in the triphenylmethane dyes, A., i, 242.
- dehydrothiotoluidine: primuline base, A., i, 647.
- estimation of benzidine and toluidine, A., ii, 507.
- behaviour of naphthols and naphthylamines with nascent bromine, A., ii, 507.
- Vedrödi, *Viktor*, analysis of fish oils, A., ii, 81.
- estimation of nicotine and ammonia in tobacco, A., ii, 630.
- Veen, *P. J. van der*. See *C. J. Lookeren*.
- Veitch, *F. P.*, modification of Pemberton's volumetric method of estimating phosphoric acid in fertilisers, A., ii, 543.
- Veley, *Victor Herbert*, inertness of alkaline earths with respect to hydrogen chloride, A., ii, 360.
- Venable, *Frank P.*, chlorides of zirconium, A., ii, 478.
- Venable, *Frank P.*, and *Charles Baskerville*, zirconium sulphite, A., ii, 527.
- Venable, *Frank P.*, and *Thomas Clarke*, zirconates, A., ii, 653.
- Vernon, *Horace Middleton*, respiration in marine invertebrates, A., ii, 195.
- Vernon Harcourt. See *Harcourt*.
- Verwey, *Aart*, pentamethenylmalonic acid and pentamethenylacetic acid, A., i, 671.
- Vesterberg, *Albert*. See *Robert Mauzelius*.

Vigouroux, Emile, nickel and cobalt silicides, A., ii, 176.
 — manganese silicide, A., ii, 249.
 — copper silicide, A., ii, 362.
 — action of silicon on metals, A., ii, 600.
Villiers, Antoine, and **M. Fayolle**, boric acid, A., ii, 75.
Villiger, Victor. See **Adolf von Baeyer**.
Viola, C., albite from Crete, A., ii, 433.
Violle, Jules, specific heat and boiling point of carbon, A., ii, 8.
 — acetylene as a photometric unit, A., ii, 347.
Vitali, Dioscoride, action of hydrogen peroxide on ammoniacal copper compounds: preparation of oxygen, A., ii, 92.
 — action of magnesium on metallic and other solutions, A., ii, 419.
 — oxalic acid and putrefaction, A., ii, 454.
 — toxicological examination for mercuric cyanide, A., ii, 628.
Vogel, H., testing of lard, A., ii, 455.
Vogel, J. Hans, and **H. Haefcke**, estimation of potassium, A., ii, 577.
Volckening, Gustave J. See **Lea McIlvaine Luquer**.
Volkening, C. See **Max Busch**.
Vongerichten, Eduard, morphine, A., i, 264.
Voorhees, Clark G. See **Thomas B. Osborne**.
Vorländer, Daniel, hydrolysis and synthesis of dihydroresorcinol, A., i, 20.
Vorländer, Daniel, and **Karl Hobohm**, action of benzaldehyde on diethyl ketone, A., i, 546.
 — condensation of ketopentamethylene with aldehydes, A., i, 603.
Wortmann, Georg, electrolytic estimation of the halogens, A., ii, 71.
Woswinkel, Arnold, thio-derivatives of phenols, A., i, 378.
Wries, Henry J. F. de, β -lactylphenylhydrazide: phenylhydrazine citrate and tartrate, A., i, 94.

W.

Wacker, Leonhard, new method for hydroxylating in the anthraquinone series, A., i, 693.
Waddell, John, vapour pressure of concentrated solutions of several salts, especially lithium and calcium nitrates, A., ii, 151.

VOL. LXX. ii.

Wagner, Georg, and **Georg Ertzschikowsky**, oxidation of pinene, A., i, 380.
Wagner, Georg, and **Alexander Ginzberg**, constitution of pinene, A., i, 380.
Wagner, Max, decomposition velocity of acids containing sulphur and nitrogen, A., ii, 470, 599.
Wagner, Paul, citrate solubility of basic slag as expressing its manurial value, A., ii, 68.
 — estimation of citrate-soluble phosphoric acid, A., ii, 448.
Wainwright, J. Howard, estimation of the solid fat in artificial mixtures of animal and vegetable fats and oils, A., ii, 550.
Walden, Paul, optically active halogen compounds, A., i, 139.
 — interconversion of optical antipodes, A., i, 205.
 — optically active derivatives of succinic acid, A., ii, 135.
 — optically active derivatives of phenylacetic acid: optical superposition, A., ii, 137.
 — characterisation of optically active substances, A., ii, 553.
 — optical rotation of stereoisomerides, A., ii, 633.
Walden, Percy T. See **Henry L. Wheeler**.
Walder, Franz. See **Ernst Täuber**.
Wales, H. See **Douglas John Carnegie**.
Walker, James, and **James R. Appleyard**, transformations of the alkyl ammonium cyanates into the corresponding ureas, T., 193; P., 1896, 12.
 — absorption of dilute acids by silk, T., 1334; P., 1896, 147.
Walker, James, and **James Henderson**, electrolysis of potassium alloethylic camphorate. Part II, T., 748; P., 1896, 110.
Walker, James Wallace, electrolysis of the salts of monhydroxy-acids, T., 1278; P., 1896, 157.
 — action of formaldehyde on phenylhydrazine and on some hydrazines, T., 1280; P., 1896, 157.
Walker, Milo S., use for laboratory purposes of the electric arc from the low potential alternating current, A., ii, 462.
Walker, Milo S. See also **Harmon Northrup Morse**.
Walker, T. L., sperrylite, A., ii, 366.
Wallace, Daniel L. See **Edgar Francis Smith**.

- Wallach, Otto**, pinole, A., i, 101.
 — oxidation products of dihydrocarvone, A., i, 102.
 — terpenes and ethereal oils: pulegone, A., i, 309.
 — condensation products of cyclic ketones: syntheses in the terpene series, A., i, 572.
- Wallach, Otto**, and **Ad. Herbig**, terpenes and ethereal oils: phellandrene, A., i, 101.
- Wallach, Otto** [and in part **G. M. Kerr**, **Henry V. Arny**, and **Richard Guericke**], terpenes and ethereal oils, A., i, 571.
- Wallach, Otto**, and **F. J. Pond**, ketones from propenyl compounds, A., i, 94.
- Waller**, improvement in Hübl's chloro-iodine process, A., ii, 454.
- Waller, Augustus D.**, action of anaesthetics on nerve, A., ii, 52.
- Wallerant, Fr.**, isomorphism of the feldspars (albite-anorthite) A., ii, 189.
- Walter, Johann**, Sandmeyer's reaction, A., i, 472.
 — pressure tube for laboratory experiments, A., ii, 297.
- Walther, Reinhold**, action of ethylic orthoformate on primary aromatic amines, A., i, 165, 534.
 — reduction by means of phenylhydrazine, A., i, 542.
- Walti, Ludwig**, influence of atropine on the secretion of urine, A., ii, 666.
- Wanklyn, James Alfred**, hexylene and hexylic hydride derived from mannitol on reduction with hydriodic acid, A., i, 2.
 — data for the ascertainment of the true atomic weight of carbon, A., ii, 165.
- Wanklyn, James Alfred**, and **William John Cooper**, fractional distillation applied to American petroleum and Russian kerosene, A., i, 1.
 — — Russian kerosene, A., i, 2.
- Warder, Robert Bowne**, chemical kinetics of oxidation. II. Mathematical theory of oxidation processes, A., ii, 297.
- Warren, Henry Nepean**, manufacture and commercial separation of beryllium, A., ii, 247.
 — electro-dissolution and its uses, A., ii, 249.
 — deposition of aluminium from aqueous solutions, A., ii, 423.
 — a non-sulphating phospho-accumulator, A., ii, 554.
 — quick nitrogen absorbent for the liberation of argon, and the manufacture of metallic lithium, A., ii, 646.
- Warren, William Homer**. See **Charles Loring Jackson**.
- Waterman, Frank Allan**, improved calorimeter for the application of the method of mixtures, A., ii, 146.
- Watkins, Willard H.** See **Arthur Amos Noyes**.
- Wedekind, Edgar**, synthesis of diphenyltetrazole, A., i, 630.
- Weed, Walter H.**, and **Louis F. Pirs-son**, igneous rocks of Yogo Peak, Montana, A., ii, 192.
- Wegscheider, Rudolf**, etherification and hydrolysis, A., i, 35.
 — formation of ethereal salts from acids and alcohols, A., i, 229.
 — behaviour of opianic acid and its ethereal salts with the reagents for aldehydes, A., i, 480.
 — phenylhydrazones and oxime of protocatechic aldehyde, A., i, 612.
- Weidel, Hugo**, and **Ernst Murmann**, nitro-derivatives of pyridine, A., i, 104.
- Weidel, Hugo**, and **Ladislaus Niemilowicz**, formation of thiazole derivatives from uric acid, A., i, 105.
- Weidel, Hugo**, and **Ernst Roithner**, decomposition of acid amides, A., i, 470.
- Weidmann, Samuel**, quartz-keratophyre of the Baraboo Bluffs, Wisconsin, A., ii, 314.
- Weigert, Leopold**, chemistry of red vegetable dyes, A., i, 387.
- Weil, Hugo**, constitution of the colour bases of the triphenylmethane series, A., i, 565.
- Weilandt, H.** See **Friedrich Krafft**.
- Weiler, Max**, formation of phenylparatolylmethane by the action of sodium on parabromotoluene, A., i, 237.
 — hydrocarbons of high molecular weight produced by the action of sodium on bromobenzene, A., i, 242.
- Weingarten, P.** See **Paul Janasch**.
- Weinland, R. F.**, and **O. Rumpf**, sulphoxyarsenates (thioarsenates), A., ii, 473.
- Weinschenk, Ernst**, andalusite and spessartite from Bodenmais, Bavaria, A., ii, 310.
 — the garnet group, A., ii, 312.
 — epidote and zoisite, A., ii, 568.
 — the "dilute coloration" of minerals, A., ii, 654.
- Weintraud, Wilhelm**, nucleïn and the formation of uric acid, A., ii, 488.

- Weintraud, *Wilhelm*, formation of uric acid in man, A., ii, 488.
 — relationship of levulinic acid to acetoneuria, A., ii, 490.
 — excretion of uric acid and xanthine bases by the faeces, A., ii, 490.
 Weinzweig, *S.* See *Carl Hell*.
 Weiske, *Hugo*, digestibility of the pentosans of vegetable foods, A., ii, 375.
 Weiske, *Hugo*. See also *A. Wicke*.
 Weisse, *Karl*, introduction of a fourth radicle in place of the hydroxyl group of triphenylcarbinol, A., i, 565.
 Weller, *Heinrich*, estimation of fat in milk, A., ii, 228.
 Wells, *Horace Lemuel*, and *Bertram B. Boltwood*, double salts of caesium chloride with chromium trichloride and uranyl chloride, A., ii, 107.
 Wells, *Horace Lemuel*, and *H. W. Foote*, double fluorides of caesium and zirconium, A., ii, 179.
 Wells, *Horace Lemuel*, and *E. B. Hurlburt*, double halogen salts of ammonium and copper, A., ii, 107.
 Wells, *Horace Lemuel*, and *W. L. Mitchell*, volumetric estimation of titanous acid and iron in ores, A., ii, 502.
 Welt, *Ida*, active amyl compounds, A., i, 332.
 Wenghöffer, *Ludwig*, derivatives of phenetidine (paramidophenetoil), A., i, 360.
 Werner, *Alfred*, stereoisomeric benzhydroxamic acid derivatives, A., i, 430.
 — a peculiar class of platino compounds and the isomeric platinoxalic acids, A., i, 465.
 Werner, *Alfred*, and *A. Gemseus*, ethylenedihydroxylamine, A., i, 431.
 Werner, *Alfred*, and *J. Subak*, stereoisomeric derivatives of benzhydroxamic acids, A., i, 431.
 Wesbrook, *Frank F.*, growth of cholera bacilli in sunlight, A., ii, 265.
 Wesbrook, *Frank F.* See also *W. B. Hardy*.
 Wesson, *David*, examination of lard for impurities, A., ii, 228.
 Wharton, *Frederick Malcolm*. See *Percy Faraday Frankland*.
 Wheeler, *Henry Lord*, halogen additive products of the anilides, A., i, 23.
 — action of bromine on metanitriline, A., i, 156.
 Wheeler, *Henry Lord*, and *B. B. Boltwood*, action of acid chlorides on the silver salts of the anilides, A., i, 478.
 Wheeler, *Henry Lord*, and *B. W. McFarland*, mercury salts of anilides, A., i, 609.
 Wheeler, *Henry Lord*, and *Percy T. Walden*, halogen additive products of the anilides, A., i, 367.
 White, *Arthur H.*, nutrition of the frog's heart, A., ii, 437.
 White, *John, jun.*, sulphonephthaleins, A., i, 49.
 Whitehead, *Cabell*, separation of tellurium from copper residues, A., ii, 164.
 Whitfield, *James Edward*. See *Andrew A. Blair*.
 Whitney, *Willis Rodney*, chromium salts, A., ii, 525.
 Wicke, *A.*, and *Hugo Weiske*, digestibility and nutritive value of pumpkin seed cake and buckwheat grain, A., ii, 198.
 — — influence of fat and starch on metabolism, A., ii, 535.
 Widman, *Oskar*, hydroxytheophylline, A., i, 626.
 — a group of 3 : 1-hydroxyphenyltriazoles, A., i, 629.
 Wiede, *O. Fritz*, and *Karl A. Hofmann*, new series of metallic ammonia compounds, A., ii, 363.
 Wiede, *O. Fritz*. See also *Karl A. Hofmann*.
 Wiedemann, *Ernst Eilhard Gustav*, and *Gerhard Carl Schmidt*, emission of light by organic substances in the gaseous, liquid, and solid conditions, A., ii, 86.
 — — luminosity of pure inorganic compounds and of solid solutions, A., ii, 287.
 — — fluorescence of sodium and potassium vapour and its importance in astrophysics, A., ii, 346.
 — — discharge phenomena in rarefied metallic vapours, A., ii, 348.
 Wiederhold, *K.* See *Theodor Zincke*.
 Wien, *Wilhelm*. See *L. Hölborn*.
 Wiglow, *Hermann*. See *Friedrich Krafft*.
 Wild, *W.* See *Carl Engler*.
 Wild, *Wilhelm*. See *Arthur Rudolf Hantzsch*.
 Wilde, *Henry*, helium and its place in the natural classification of elementary substances, A., ii, 165.
 Wilderman, *Mejer*, apparent and true freezing points, and freezing point methods, A., ii, 290.
 — experimental proof of the laws of van't Hoff, Arrhenius, Ostwald, and Dalton for dilute solutions, A., ii, 351.

- Wilderman, *Mejer*, new method of determining freezing points, A., ii, 587.
- Wiley, *Harvey Washington*, estimation of levulose in honeys and other substances, A., ii, 342.
- determination of the heat of bromination in oils, A., ii, 549.
- Wiley, *Harvey Washington*, and *Erwin E. Ewell*, estimation of lactose in milk by double dilution and polarisation, A., ii, 628.
- Wiley, *Harvey Washington*. See also *E. G. Runyan*.
- Willcox, *W. H.*, note on the estimation of butyric acid, P., 1895, 202.
- Willgerodt, *Heinrich Conrad Christoph*, rational methods for preparing iodoxy-compounds, A., i, 532.
- preparation of diphenyliodinium iodide from iodoxybenzene, A., i, 676.
- Williams, *C. B.*, estimation of phosphoric acid in soils by precipitation with molybdic solution and titration of the ammonium phosphomolybdate, A., ii, 334.
- Williams, *Rowland*, iodine and bromine absorptions of linseed oil, A., ii, 281.
- Williamson, *Sidney*. See *Thomas Purdie*.
- Willstätter, *Richard*, new methods for the preparation of tropinic acid, A., i, 65.
- resolution of tropinic acid, A., i, 265.
- derivatives of pipecolinic acid, A., i, 319.
- ketones of the tropine group. I. Tropinone, A., i, 327, 582.
- ketones of the tropine group. II. ψ -Tropine, A., i, 451.
- ketones of the tropine group. III. Tropinone and nortropinone, A., i, 582.
- ketones of the tropine group. IV. ψ -Tropigenine, A., i, 655, 709.
- ketones of the tropine group. V. An isomeride of cocaine, A., i, 707.
- ketones of the tropine group. VI. The action of bromine on tropinone, A., i, 709.
- Wilsmore, *N. T. M.* See *John Norman Collie* and *Andrew W. Craig*.
- Winter, *Heinrich*, glucic acid (?), A., i, 11.
- Winter, *J.*, constancy of the freezing point of milk and other organic liquids, A., ii, 199.
- Winterstein, *Ernst*, oxime of glucosamine hydrochloride, A., i, 520.
- Winterstein, *Ernst*, composition of *Pachyma cocos* and *Mytilia lapidescens*, A., ii, 63.
- constituents of the tissues of fungi, A., ii, 210.
- constituents of the cell membrane of various cryptogams, A., ii, 210.
- Winterstein, *Ernst*. See also *Ernst Schulze*.
- Winther, *Chr.*, theory of the decomposition of racemic compounds, A., ii, 140.
- Winton, *A. L.*, conditions affecting the accuracy of the estimation of potassium as platinumchloride, A., ii, 126.
- a modified ammonium molybdate solution, A., ii, 622.
- Winzheimer, *E.* See *Theodor Zincke*.
- Wislicenus, *Hans*, reduction of the nitro-group to the hydroxylamine group, A., i, 298.
- "excited" metals: use of excited aluminium for reduction in neutral solution, A., i, 671.
- Wislicenus, *Johannes*, and *Felix Seeler*, stilbene dibromides and monobromostilbenes, A., i, 98.
- Wislicenus, *Wilhelm*, behaviour of alkaline solutions of ethylic formylphenylacetate towards acids, A., i, 369.
- isomerism of ethylic formylphenylacetate, A., i, 552.
- Wissel, *Ernst*, gas formation in the human stomach, A., ii, 196.
- Witt, *Duyrené de*, preparation of mannose, A., i, 459.
- Witt, *O.* See *M. Apel*.
- Woelfer, *J.*, boiling points of solutions of salts in methylic and ethylic alcohols, A., ii, 237.
- Wörner, *Emil*, isomerism of trithioaldehydes, A., i, 225.
- Wolesky, *F.*, detection of wood pulp in paper, A., ii, 505.
- Wolf, *C. G. L.* See *Siegfried Ruhemann*.
- Wolff, *Adolf*. See *Rudolf Fittig*.
- Wolff, *Fritz*. See *Wilhelm Koenigs*.
- Wolff, *Heinrich*, compounds of amidoguanidine with the sugars, A., i, 78.
- Wolff, *John E.*, and *Ralph S. Tarr*, felspar of the aemite-trachyte of the Crazy Mountains, Montana, A., ii, 37.
- Wolff, *Ludwig*, constitution of tetric acid (α -methyltetric acid), A., i, 87.
- Wolff, *Ludwig* [and *Carl Schwabe*], tetric acid, A., i, 522.
- Wolffenstein, *Richard*, stereoisomerism of coniines, A., i, 631.
- Wolffenstein, *Richard*. See also *Peter Knudsen* and *Ludwig Levy*.

- Woltering, *H. W. F. C.*, absorption of iron salts, A., ii, 197.
- Wood, *R. W.*, degree of dissociation at zero temperature, A., ii, 236.
- absorption spectra of iodine and bromine solutions above the critical temperature of the solvent, A., ii, 458.
- a new form of mercury air pump, A., ii, 516.
- Wood, *Thomas Barlow*, available potash and phosphoric acid in soils, T., 287; P., 1896, 13.
- Wood, *Thomas Barlow*, *W. T. Newton Spivey*, and *Thomas Hill Easterfield*, charas, the resin of Indian hemp, T., 539; P., 1896, 76.
- Wood, *William Henry*. See *James Proude*.
- Woods, *Charles Dayton*, and *C. S. Phelps*, feeding experiments on sheep, A., ii, 44.
- Woolcott, *George Harold*. See *Raphael Meldola*.
- Wray, *Edward*. See *Raphael Meldola*.
- Wülfing, *Ernst Anton*, pyroxene from Renfrew, A., ii, 432.
- Wust, *F.*, a new apparatus for estimating carbon, A., ii, 449.
- Wynne, *William Palmer*. See *Henry Edward Armstrong*.
- Wyplel *M.* [[?] *Wypfel*], effect of chlorides, bromides, and iodides on algæ, A., ii, 266.

Y.

- Yoder, *Minnie B.* See *John Maxson Stillman*.
- Yoshimura, *K.*, composition of some mncilages, A., ii, 60.
- behaviour of hippuric acid in soils, A., ii, 67.
- Young, *George*, substituted hydroxyphenyltriazoles, i, 702.
- Young, *James*, and *Charles R. Darling*, transferring gases to vacuum tubes for spectroscopic examination, A., ii, 3.
- Young, *Sydney*. See *G. L. Thomas*.

Z.

- Zaharia, *Al. J.*, action of chlorine on glycerol in presence of iodine, A., i, 634.
- action of the chlorides of phosphorus on halogenised phenols, A., i, 646.

- Zaharia, *Al. J.* See also *Lăzar Edeleanu*.
- Zaleski, *Stanislaus Szcz von*, amount of silica and quartz in granite, A., ii, 262.
- Zambiasi, *Giulio*, disappearance of the meniscus at the critical point, A., ii, 234.
- phenomena observed at the critical point, A., ii, 234.
- Zanardi. See *Lamberti-Zanardi*.
- Zanetti, *Carlo Umberto*, conversion of acetylacetone into pyrroline derivatives, A., i, 249.
- Zangemeister, *Wilhelm*, a colorimeter: colorimetric estimation of hæmoglobin, A., ii, 404.
- Zanninovich-Tessarini, *Hugo*, electrolytic dissociation in formic acid solutions, A., ii, 352.
- Zecchini, *F.*, organic compounds containing quadrivalent oxygen, A., i, 197.
- new molecular refraction formula, A., ii, 285.
- Zelinsky, *Nicolai D.*, stereoisomeric dimethyltricarballic acids, A., i, 349.
- Zelinsky, *Nicolai D.*, and *A. Generoso*, the hexamethylene series: IV. Synthesis of heptanaphthene, A., i, 350.
- Zelinsky, *Nicolai D.*, and *W. Isaieff*, stereoisomeric dimethyldihydroxyadipic acids, A., i, 413.
- Zelinsky, *Nicolai D.*, and *A. Porchunoff*, action of carbon tetrachloride on methylic sodiomalonate, A., i, 135.
- Zelinsky, *Nicolai D.*, and *Alexandr A. Reformatsky*, trimethylpimelic acid, A., i, 130.
- — the hexamethylene series: synthesis of nononaphthene, A., i, 210.
- Zelinsky, *Nicolai D.*, and *M. Rudsky*, synthesis in the pentamethylene series, A., i, 286.
- Zelinsky, *Nicolai D.*, and *N. Tschernowitoff*, stereoisomeric dimethyltricarballic acids, A., i, 281.
- Zelinsky, *Nicolai D.*, and *L. Tschugéeff*, dihydroxytrimethylglutaric acid, A., i, 135.
- Zellner, *Julius*, rapic acid, A., i, 592.
- Zemjatschensky, *Petr A.*, desmine (stilbite) and laumontite from the Caucasus, A., ii, 369.
- glauconite, A., ii, 568.
- Ziegenbein, *E.*, metabolism and respiration in sprouting potato tubers, A., ii, 265.
- Ziegler, *E.* See *Karl Auwers*.
- Zinberg, *S.* See *Paul Friedländer*.

- Zincke, Ernst Carl Theodor**, action of hypochlorous acid on diazo-compounds, A., i, 169.
 — new series of quinonoid derivatives, A., i, 214.
 — conversion of bromoprotocatechuic acid into a dibromorthonaphthaquinonecarboxylic acid, A., i, 308.
 — orthodinitroso-derivatives of the benzene series, A., i, 429.
- Zincke, Ernst Carl Theodor**, and **Bruno Helmert**, constitution of the azimides [azoinimides], A., i, 300.
 — azimido-compounds. IV. Azimido-uramidobenzoic acids and azimido-benzoic acids, A., i, 547.
- Zincke, Ernst Carl Theodor**, and **K. Wiederhold**, action of chlorine on hydroxyquinolines. IV. Dichloro- β -quinolinequinone, A., i, 501.
- Zincke, Ernst Carl Theodor**, and **E. Winzheimer**, action of chlorine on hydroxyquinolines. III. chlorohydroxy- α -quinolinequinone, A., i, 499.
- Zjemjatschensky**. See **Zemjatschensky**.
- Zopf, Wilhelm**, compounds from lichens: atranoric acid, and substances accompanying it, A., i, 103.
- Zoppellari, I.**, freezing of dilute solutions, A., ii, 514.
 — cryoscopic behaviour and composition of some acetates of feeble bases, A., ii, 515.
- Zschau, E.**, zeolites of the syenite near Dresden, A., ii, 189.
- Zschimmer, E.**, hyacinth (quartz), in gypsum near Jena, A., ii, 528.
- Zsigmondy, Richard**, absorption of radiant heat by liquids, A., ii, 464.
- Zülzer, G.**, alloxuric substances in the urine in nephritis, A., ii, 667.
- Zulkowski, Karl**, and **Boh. Franz**, action of heat on starch dissolved in glycerol, A., i, 120.
- Zuntz, Nathan**, phloridzin diabetes, A., ii, 667.

OMISSIONS.

Page col.

- 699 1 **Dixon, Augustus Edward**, thiocarbimides derived from complex fatty acids, T., 1593 ; P., 1896, 223.
- 708 2 **Hada, Seihachi**, how mercurous and mercuric salts change into each other, T., 1667 ; P., 1896, 182.

INDEX OF SUBJECTS.

ABSTRACTS. 1896. Parts I & II.

(Marked A. i and A. ii respectively); and also to Transactions, 1896 (marked T.); and to Proceedings of the Session 1895—1896, Nos. 155 to 168, Nov., 1895—June, 1896 (marked P.).

INDEXERS.

J. BRUCE.
A. W. CROSSLEY, M.Sc., Ph.D.
T. EWAN, B.Sc., Ph.D.
M. O. FORSTER, Ph.D.
J. S. HALDANE, M.A., M.D.

H. A. D. JOWETT, D.Sc.
P. A. E. RICHARDS.
L. J. SPENCER, M.A.
J. F. THORPE, Ph.D.

A.

Abies canadensis, oil of (UMNEY), A., i, 380.

Abies excelsa, temperature optimum for respiration of (ZIEGENBEIN), A., ii, 265.

oil of (UMNEY), A., i, 380.

Abrin, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

Absorption of acids and alkalis from solution by platinum black (KELLNER), A., ii, 232.

of iron by the living body (WOLTERING), A., ii, 197.

physiological, physical factors in (HAMBURGER), A., ii, 50.

of fluids from the tissues into the blood (STARLING), A., ii, 438.

influence of nerves on, in the intestine (REID), A., ii, 663.

of peptone by the intestine (REID), A., ii, 318.

Absorption-coefficients of gases. See Solubility.

Acanthite from Colorado (CHESTER), A., ii, 566.

Acenaphthene, magnetic rotatory power, &c., of (PERKIN), T., 1088, 1089, 1197, 1242.

heat of solution in methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.

Acenaphthene, oxidation of (HODGKINSON), P., 1896, 110.

Acenaphtheneglycol. See Acenaphthyleneglycol.

Acenaphthenone, from acenaphthaquinone: its pierate, and phenylhydrazone (GRAEBE and JEQUIER), A., i, 444.

brom- (GRAEBE and JEQUIER), A., i, 444.

di chlor- (GRAEBE and JEQUIER), A., i, 444.

Acenaphthyleneglycol, modifications of (GRAEBE and JEQUIER), A., i, 444.

Acetal, heat of combustion of (RIVALS), A., ii, 588.

chlor-, heat of combustion of (RIVALS), A., ii, 589.

Acetaldehyde, formation of, from ether by action of light (RICHARDSON and FORTEY), T., 1355; P., 1896, 166.

action of sodium on (FREER), A., i, 589.

and benzoic chloride, action of sodium on (FREER), A., i, 589.

behaviour of, towards 1:3:4-xylydine (MILLER and PLÖCHL), A., i, 534.

estimation of, in spirits of wine (MEDICUS), A., ii, 505.

Paraldehyde, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

Acetaldehydediphenylhydrazine (CAUSSE), A., i, 611.

- Acetaldehydephenylhydrazone, modifications of (FISCHER), A., i, 361.
- Acetamide, heat of solution in water and ethylic alcohol of (SPEYERS), A., ii, 411.
- action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- action of phosphorus trichloride on (LACHMANN), A., i, 601.
- condensation of, with chloroacetone (OSTROGOVICH), A., i, 262.
- salts of (TOPIN), A., i, 282, 283.
- Acetamide, dibrom- (WOLFF and SCHWABE), A., i, 524.
- chlorobrom- (CONRAD and SCHMIDT), A., i, 409.
- cyan-, thermochemical data of (GUINCHANT), A., ii, 465.
- action of sodium ethoxide on (ERRERA), A., i, 528.
- action of sodium ethoxide and methylic, ethylic, propylic, or benzylic iodide on (ERRERA), A., i, 529.
- Acetamidoacetic acid (RADENHAUSEN), A., i, 137.
- ethylic salt (RADENHAUSEN), A., i, 137.
- Acetamido-acetohydrazide (RADENHAUSEN), A., i, 138.
- Acetamido-acetylearbanil (RADENHAUSEN), A., i, 138.
- Acetamidobenzene, brom- (SLOSSON), A., i, 216.
- o*-Acetamidobenzenylazoxime-ethenyl (PINNOW and SÄMANN), A., i, 367.
- Acetamidobenzhydrol (GABRIEL and STELZNER), A., i, 506.
- o*-Acetamidobenzonitrile (PINNOW and SÄMANN), A., i, 366.
- o*-Acetamidobenzophenone, oxime of (AUWERS and EWING), A., i, 504.
- o*-Acetamidobenzyl-*p*-bromaniline (BUSCH and HEINEN), A., i, 159.
- o*-Acetamidobenzyl-*p*-chloraniline (BUSCH and VOLKENING), A., i, 158.
- α -Acetamido- π -bromoeamphor (LAPWORTH and KIPPING), T., 317.
- Acetamidocarbazine, nitro- (MAZZARA and LEONARDI), A., i, 392.
- p*-Acetamidocaryacrol (PLANCHER), A., i, 359.
- nitro-, acetate (SODERI), A., i, 359.
- Acetamidodiphenyl (PICTET and HUBERT), A., i, 483.
- 4-Acetamidomenthol (TIEMANN and KRÜGER), A., i, 384.
- Acetamidomenthone (TIEMANN and KRÜGER), A., i, 384.
- 1-Acetamido-3-methylindazole, 4-chloro- (GABRIEL and STELZNER), A., i, 320.
- β -Acetamido- μ -methylthiazole- α -carboxylacetamide (WEIDEL and NIEMIŁOWSKI), A., i, 106.
- β -Acetamido- μ -methylthiazole- α -carboxylonitrile (WEIDEL and NIEMIŁOWSKI), A., i, 106.
- Acetamidonaphthoquinone, condensation of, with benzyl-*o*-phenylenediamine (KEHRMANN and TIKHVINSKY), A., i, 511.
- condensation of, with phenyl-*o*-phenylenediamine (KEHRMANN and HERTZ), A., i, 508.
- 2 : 3-Acetamidonaphthoic acid (MÖHLAU), A., i, 243.
- 2' : 1-Acetamidonaphthol (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 1 : 2'-Acetamidonaphthol (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 1 : 3 : 4-Acetamidonaphtholsulphonic acid (FRIEDLÄNDER and RÜDT), A., i, 569.
- Acetamidonitrodiphenylamine. See Diphenylamine.
- o*-Acetamidophenol and its acetyl derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1323.
- 2 : 4-bromonitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1326; P., 1896, 163.
- anhydride (MELDOLA, WOOLCOTT, and WRAY), T., 1327; P., 1896, 164.
- 5-nitro-, acetyl derivative of (MELDOLA, WOOLCOTT, and WRAY), T., 1325; P., 1896, 163.
- p*-Acetamidophenol, benzyl ether of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- m*-Acetamidophenyl *p*-tolyl ketone (LIMPRICHT and LENZ), A., i, 41.
- p*-Acetamidophenyl *p*-tolyl ketone (LIMPRICHT and SAMIETZ), A., i, 42.
- Acetamidophenylazimidobenzene. See Phenylaminoazimidobenzene.
- Acetamidophenylic ether (HAEUSSERMANN and TEICHMANN), A., i, 533.
- Acetamidophenyltolylsulphone. See Phenylaminotolylsulphone.
- 1-Acetamidoquinoline (CLAUS and SETZER), A., i, 498.
- 3-nitro- (CLAUS and HARTMANN), A., i, 392.
- 4-nitro- (CLAUS and HARTMANN), A., i, 391.
- 3-Acetamidoquinoline (CLAUS and SCHNELL), A., i, 320.
- 2-brom-, and its hydrobromide (CLAUS and SCHNELL), A., i, 320.
- di*brom- (CLAUS and SCHNELL), A., i, 320.

- 4-Acetamidoquinoline (CLAUS and SETZER), A., i, 499.
 1-brom- (CLAUS and SETZER), A., i, 499.
 5-Acetamidotetrazole (THIELE and INGLE), A., i, 107.
 Acetamidothymol (PLANCHER), A., i, 358.
 nitro-, acetate of (SODERI), A., i, 359.
 4-Acetamido-2 : 2 : 6-trimethylpiperidine and its aurochloride and thiocarbamate (HARRIES), A., i, 318.
 4-Acetamido-*m*-xylene, 5-iod- (KERSCHBAUM), A., i, 162.
 Acetanilide, constitution of (COHEN and ARCHDEACON), T., 96.
 magnetic rotatory power, &c., of (PERKIN), T., 1114, 1216, 1246.
 heat of solution in methylic and ethylic alcohols and chloroform (SPEYERS), A., ii, 411.
 action of bromine on (VAUBEL), A., i, 157.
 action of sulphur on (HOFMANN LECTURE), T., 713.
 use of, in preparing aniline derivatives (HOFMANN LECTURE), T., 695.
 salts of (TOPIN), A., i, 283.
 hydriodide (WHEELER and WALDEN), A., i, 367.
 di- and tetra-iodide of (WHEELER and WALDEN), A., i, 367.
 sodium ethoxide (COHEN and ARCHDEACON), T., 93.
 sodium methoxide, preparation of (COHEN and ARCHDEACON), T., 91; P., 1896, 8.
 action of benzoic chloride on (COHEN and ARCHDEACON), T., 92.
 Acetanilide, *p*-brom-, hydrobromide (WHEELER and WALDEN), A., i, 367.
 hydrobromide, di- and tetra-bromide of (WHEELER and WALDEN), A., i, 367.
 1 : 3 : 5-*tribrom*-, mercury compound of (WHEELER and MCFARLAND), A., i, 609.
 2 : 4 : 5-*tribrom*- (JACKSON and GALIVAN), A., i, 353.
 4 : 3-bromonitro- (WHEELER), A., i, 23.
 6 : 3-bromonitro- (WHEELER), A., i, 156.
p-chlor- (CHATTAWAY and EVANS), T., 849; P., 1896, 97.
o-p-dichlor-, and its hypochlorite (CHATTAWAY and EVANS), T., 849, 850; P., 1896, 97.
 cyan- (HALLER), A., i, 32.
 Acetanilide, *m*-nitro-, dibromide (WHEELER), A., i, 23.
 hydrobromide, di-, tetra-, and hexa-bromide of (WHEELER and WALDEN), A., i, 367.
p-nitro-, heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.
 Acet-*o*-anisidide, 4-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1330; P., 1896, 164.
 5-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1331; P., 1896, 164.
 Aceto-*p*-aniside, *o*-iod- (REVERDIN), A., i, 475.
 Acetazimidobenzoic acid (ZINCKE and HELMERT), A., i, 550.
 Acetenamine. See Diethylenediamine.
 Acetethylanilamide, action of sodium methoxide and ethoxide on (COHEN and ARCHDEACON), T., 95; P., 1896, 8.
 Acethydroxamic acid, action of benzoic chloride on (NEF and JONES), A., i, 460.
 Acetic acid, formation of, from ether by action of light (RICHARDSON and FORTER), T., 1355; P., 1896, 166.
 production of, from various woods (BARILLOT), A., i, 403.
 magnetic rotatory power of (PERKIN), T., 1251.
 heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
 specific heat of solid and liquid (MASSOL and GUILLOT), A., ii, 8.
 heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
 and water, distillation of a mixture of (GOREL), A., i, 463.
 freezing points of aqueous solutions of (PONSOT), A., ii, 412.
 freezing points of concentrated aqueous solutions of (ROLOFF), A., ii, 291.
 influence of pressure on the freezing point of a benzene solution of (COLSON), A., ii, 157.
 density of very dilute solutions of (KOHLEAUSCH), A., ii, 90.
 action of uranium salts on (FAY), A., i, 465.
 absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
 (pyroligneous acid), estimation of acidity of (SCHEURER-KESTNER), A., ii, 454.
 Acetic acid, lead salts, influence of, on the estimation of invert sugar (BORNTÄGER), A., ii, 278.

Acetic acid,

lead tetracetate, history and preparation of (HUTCHINSON and POLLARD), T., 212, 213; P., 1896, 31.

crystallography of (HUTCHINSON and POLLARD), T., 215; P., 1896, 31.

action of glacial acetic acid on (HUTCHINSON and POLLARD), T., 214.

action of halogen acids on (HUTCHINSON and POLLARD), T., 218, 219, 220; P., 1896, 31.

action of hydrogen sulphide on (HUTCHINSON and POLLARD), T., 220.

action of orthophosphoric acid on (HUTCHINSON and POLLARD), T., 221; P., 1896, 31.

action of sulphuric acid on (HUTCHINSON and POLLARD), T., 221.

action of water on (HUTCHINSON and POLLARD), T., 214, 218; P., 1896, 31.

Acetic acid, acetamidocarvacrylic salt of (SODERI), A., i, 359.

o-acetamidophenylic salt, and its hydrate and 5-nitro-derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1323; P., 1896, 163.

acetamidothymylic salt, nitro- (SODERI), A., i, 359.

acetoguaiacolamide salt, nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1331; P., 1896, 164.

3:4-aminohydroxybenzoic acid salt (DIEPOLDER), A., i, 615.

amylic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.

iso-amylic salt, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

anthraflavic acid salt (HOFMANN LECTURE), T., 633.

benzaldehyde, *m*-iodoso-, salt (PATERSON), T., 1004; P., 1896, 153.

benz-*anti*-aldoxime salt (LUXMOORE), T., 188.

butylic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.

coniine salt, cryoscopic behaviour in benzene solution of (ZOPPELLARI), A., ii, 515.

crotonylic salt (CHARON), A., i, 661.

di-*iso*-amylamine salt, cryoscopic behaviour in benzene solution of (ZOPPELLARI), A., ii, 515.

di-*iso*-butylamine salt, cryoscopic

behaviour in benzene solution of (ZOPPELLARI), A., ii, 515.

Acetic acid, *m*-diethylaminophenylic salt (MEYENBURG), A., i, 292.

dipropylamine salt, cryoscopic behaviour in benzene solution of (ZOPPELLARI), A., ii, 515.

duroquinol salt (RÜGHEIMER and HANKEL), A., i, 677.

ethylic salt, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.

hydrolysis of, by acids under pressure (ROTHMUND), A., ii, 594.

rate of hydrolysis by sodium hydroxide and ethoxide in alcoholic solution (GENNARI), A., ii, 413.

ethylic hydroxymethylenepherylacetate salt, dibromide of (WISLICENUS), A., i, 553.

formanilide mercury salt (WHEELER and MCFARLAND), A., i, 609.

guaiacol salt (MELDOLA), P., 1896, 126.

nitro- (MELDOLA), P., 1896, 126.

2-hydroxybenzylideneacetone salt, 5-bromo- (KOSTANECKI and SCHNEIDER), A., i, 614.

hydroxymethylenepherylacetic acid, salt of (WISLICENUS), A., i, 553.

isatinanhydroglycopyrogallol salt (FRIEDLÄNDER and RÜDT), A., i, 607.

iso- β -lapachol salt (HOOKER), T., 1364.

α -lapachone salt (HOOKER), T., 1371.

methylic salt, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.

molecular volume of the, in organic solvents (NICOL), T., 143; P., 1895, 237.

hydrolysis of, by acids under pressure (ROTHMUND), A., ii, 594.

rate of hydrolysis by sodium hydroxide and ethoxide (GENNARI), A., ii, 413.

estimation of, in pyroligneous products (SCHEURER-KESTNER), A., ii, 454.

peonol salt, bromo-, and its piperonaldehyde derivative (FRIEDLÄNDER and RÜDT), A., i, 607.

phenol, 4-chloro-3-nitro-salt (MELDOLA, WOOLCOTT, and WRAY), T., 1323; P., 1896, 163.

phenol, 2-chloro-4-nitro-, salt of (MELDOLA, WOOLCOTT, and WRAY), T., 1328; P., 1896, 164.

- Acetic acid, phenylhydrazine salt, cryoscopic behaviour of, in benzene solution (ZOPPELLARI), A., ii, 515.
- phenylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1075, 1076, 1179, 1238.
- piperidine salt, cryoscopic behaviour of, in benzene solution (ZOPPELLARI), A., ii, 515.
- propylic salt, heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
- pyrogallol salt, trichloro- (BIÉTRIX), A., i, 651.
- resacetophenone salt (FRIEDLÄNDER and RÜDT), A., i, 607.
- bromo- (FRIEDLÄNDER and RÜDT), A., i, 607.
- Acetic acid, amino-. See Glycocine.
- ethylic salt, hydrochloride of, action of nitrous acid on (CURTIUS), A., i, 337.
- action of ethylic chlorocarbonate on (HANTZSCH and METCALF), A., i, 521.
- brom-, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- chloro- derivatives of, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- heat of combustion of the ethylic salts of (RIVALS), A., ii, 588.
- rate of etherification of (LICHTY), A., ii, 557.
- action of hydroxylamine on (HANTZSCH and WILD), A., i, 285.
- chlor-, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- thermochemical data of the amide and ammonium salt of (RIVALS), A., ii, 400.
- dichlor-, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- freezing points of dilute solutions of (WILDERMANN), A., ii, 351.
- trichlor-, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- electrolytic conductivity of ethereal solutions of (MALTBY), A., ii, 144.
- freezing points of dilute solutions of (WILDERMANN), A., ii, 351.
- thermochemical data of the amide and ammonium salt of (RIVALS), A., ii, 410.
- methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
- Acetic acid, cyan-, thermochemical data of (GUINCHANT), A., ii, 465.
- action of isobutaldehyde on (BRAUN), A., i, 594.
- ethylic salt, thermochemical data of (GUINCHANT), A., ii, 12.
- methylic salt, thermochemical data of the (GUINCHANT), A., ii, 12.
- sodio-, ethylic salt, action of acetic chloride on (GUINCHANT), A., i, 594.
- methylic salt, action of acetic chloride on (GUINCHANT), A., i, 594.
- hydroxylamino- (HANTZSCH and WILD), A., i, 286.
- oxime, nitro-, ethylic salt of (JOVITSCHITSCH), A., i, 82.
- thio-, behaviour of, with certain inorganic salts (TARUGI), A., i, 125.
- Acetic anhydride, action of hydrogen fluoride on (COLSON), A., i, 346.
- Acetic fluoride (COLSON), A., i, 346.
- Acetic peroxide (VANINO and THIELE), A., i, 597.
- Acetic- α -sulphonepropionic acid (LOVÉN), A., i, 413.
- Acetic- β -sulphonepropionic acid (LOVÉN), A., i, 413.
- Acetic- α -thiopropionic acid. See Lactylglycollic acid, thio-.
- Acetic- β -thiopropionic acid. See Glycolhydraerylic acid, thio-.
- Acetoacetic acid, ethylic salt, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- volatility of its copper compound (JAPP and LANDER), T., 737.
- tautomerism of (TRAUBE), A., i, 593.
- action of bromine on, in presence of carbon bisulphide (CONRAD and SCHMIDT), A., i, 409.
- action of bromine on, in presence of water (CONRAD and SCHMIDT), A., i, 409.
- action of nitric acid and nitrous acid on (JOVITSCHITSCH), A., i, 82.
- action of ethylic orthoformate on (CLAISEN), A., i, 463.
- action of ethylic chlorofumarate and ethylic chloromaleate on (RUHEMANN and TYLER), T., 532; P., 1896, 73.
- and glyoxylic acid, action of sulphuric acid on (BOETTINGER), A., i, 410, 411.
- and ethylic α -brom-*iso*-butyrate, action of zinc on (PERKIN and THORPE), P., 1896, 156.

- Acetoacetic acid, ethylie salt, velocity of formation of alkyl derivatives of (BISCHOFF), A., i, 84.
- condensation of, with aldehydes (KNOEVENAGEL), A., i, 210.
- condensation of, with benzil (JAPP and LANDER), T., 736; P., 1895, 146.
- condensation of, with α -chloroacetic acid (RUHEMANN and WOLFF), T., 1391; P., 1896, 166.
- condensation of, with formaldehyde (SCHIFF and PROSIO), A., i, 250.
- condensation of, with piperazine (ROSDALSKY), A., i, 257.
- methylie salt, thermochemical data of (GUINCHANT), A., ii, 12.
- Acetoacetic acid, α - and γ -brom-, ethylie salt (CONRAD and SCHMIDT), A., i, 409.
- di*brom-, ethylie salt, action of heat on (WOLFF and SCHWABE), A., i, 522, 523.
- aa*-*di*brom-, ethylic salt, action of, with thioearbamide (CONRAD and SCHMIDT), A., i, 409.
- aa*-chlorobrom-, ethylie salt (CONRAD and SCHMIDT), A., i, 409.
- cyan-, ethylie salt, thermochemical data of (GUINCHANT), A., ii, 12.
- methylic salt, thermochemical data of (GUINCHANT), A., ii, 12.
- oxime, ethylie salt, *syn*- and *anti*-modifications, and their bromine derivatives (JOVITSCHITSCH), A., i, 82, 83.
- crystalline, condensation product of (SCHIFF), A., i, 83.
- amphidioxime, ethylie salt (SCHIFF), A., i, 83.
- sodio-, ethylie salt, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- action of ethylie α -bromisobutylacetate on (AUWEBS and SCHIFFER), A., i, 644.
- action on ethylic β -bromolevulinic acid (EMERY), A., i, 638.
- action of ethylic chloroacetate on (BISCHOFF), A., i, 466.
- action of ethylic β -iodopropionate on (BENTLEY and PERKIN), T., 1511.
- sodioalkyl-, comparative ease of the action of the ethylie salts of *d*-bromo-fatty acids on the ethylic salts of (BISCHOFF), A., i, 464.
- Acetoacetanilide, oxime of (SCHIFF), A., i, 83.
- Acetoacetylhydrazide (CURTIUS and HOFMANN), A., i, 648.
- Acetoamygdalyl-*p*-phenetolamide (WENGHÖFFER), A., i, 360.
- Acetobenzamide (BLACHER), A., i, 33.
- Acetobenzanilide (WHEELER and MCFARLAND), A., i, 609.
- Aceto-*o*-benzoic sulphimide (ECKENROTH and KOERPPEN), A., i, 438.
- Acetobenzylanilide (BLACHER), A., i, 33.
- Acetoethylpyridinecarboxylic acid, dichlor- (ZINCKE and WEIDERHOLD), A., i, 501.
- Acetodibenzoethylenediamine (LADENBURG), A., i, 201.
- Aceto-1 : 4 : 2-dimethylnaphthylamide (CANNIZZARO and ANDREOCCI), A., i, 488.
- Acetodimethyl-3 : 4-tolylenediamine (PINNOW), A., i, 162.
- Acetodiphenylamide, action of sodium methoxide and ethoxide on (COHEN and ARCHDEACON), T., 94; P., 1896, 8.
- Aceto-2 : 5-diphenyldisulphone-*p*-aminophenylamide (HINSBERG and HIMMELSCHNIG), A., i, 686.
- Acetodipropylene- ψ -hydrazodicarbothiamide (FREUND and HEILBRUN), A., i, 416.
- Aceto-*p*-ethoxyphenyl-1 : 2 : 5-tolylenediamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 24.
- Aceto-4-ethoxy-*m*-tolyl-*p*-phenylenediamine (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- Aceto-4-ethoxy-*o*-tolyl-*p*-phenylenediamine (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- Aceto-*p*-ethoxy-*m*-tolyl-1 : 2 : 5-tolylenediamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 26.
- Aceto-*p*-ethoxy-*o*-tolyl-1 : 2 : 5-tolylenediamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 26, 27.
- Acetoguaiacolamide, nitro-
[OH : OMe : NO₂ : NHAc
= 1 : 2 : 4 : 6] (MELDOLA, WOOLCOTT, and WRAY), T., 1331; P., 1896, 164.
- Acetoguanamide. See Methyldioxytriazine.
- Acetohippurylhydrazine, symmetrical (CURTIUS), A., i, 37.
- Acetohippurylphenylhydrazine (CURTIUS), A., i, 37.
- Acetohydrazide, preparation of (CURTIUS and HOFMANN), A., i, 648.
- Acetohydroxydiphenylamine (NIETZKI and SIMON), A., i, 164.

- Aceto- α -hydroxy- $\alpha\beta$ -diphenylethyl amine (SÖDERBAUM), A., i, 484.
- Aceto- β -lactylcarbamide (WEIDEL and ROITHNER), A., i, 470.
- Acetomenthoximie acid (BECKMANN and MEHRLÄNDER), A., i, 312.
- Aceto-*m*-methoxyphenylamide, compound of, with iodine (PIUTTI), A., i, 364.
- Aceto-*p*-methylbenzylamide (LUSTIG), A., i, 163.
- Acetomethylearbamide, product of, distillation of (SCHIFF), A., i, 530.
- Aceto- β -methyl- β -lactylcarbamide (WEIDEL and ROITHNER), A., i, 470.
- Acetomethyl-*p*-toluidide, *o*-nitro- (PINNOW), A., i, 161.
- Aceto- α -naphthylamide sodium ethoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- Aceto- β -naphthylamide sodium ethoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- Aceto- α -naphthylamide sodium methoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- Acetone, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- barium hydrogen sulphite (FAGARD), A., i, 39.
- strontium hydrogen sulphite (FAGARD), A., i, 39.
- compounds of polyhydric alcohols with (SPEIER), A., i, 77.
- action of magnesium on (KEISER), A., i, 457.
- action of ethylic orthoformate on (CLAISEN), A., i, 464.
- action of ethylic α -bromopropionate on (PERKIN and THORPE), T., 1482; P., 1896, 156.
- action of zinc and ethylic bromisobutyrate on (REFORMATSKY and PLESCONOSSOFF), A., i, 128.
- condensation of, with salicylaldehyde (CORNELSON and KOSTANECKI), A., i, 240.
- causes of presence of, in urine (ABRAM), A., ii, 264.
- sources of, in urine (WEINTRAND), A., ii, 490.
- examination of (SCHWEITZER and LUNGWITZ), A., ii, 486.
- estimation of (GEELMUYDEN), A., ii, 679.
- acetone, chlor-, action of potassium iodide on (SCHOLL and MATTHAIPOULOS), A., i, 521.
- action of hydroxylamine on (HANTZSCH and WILD), A., i, 285.
- Acetone, chlor-, action of hydroxylamine hydrochloride and sodium carbonate on (SCHOLL and MATTHAIPOULOS), A., i, 520.
- condensation of, with acetamide (OSTROGOVICH), A., i, 262.
- iod- (SCHOLL and MATTHAIPOULOS), A., i, 521.
- iso*-Acetone ethyl ether. See Ethoxypropylene.
- Acetonedicarboxylic acid and acetaldehyde, action of hydrogen chloride on (PETRENKO-KRITSCHENKO and STANISCHEWSKY), A., i, 472.
- and benzaldehyde, action of hydrogen chloride on (PETRENKO-KRITSCHENKO and STANISCHEWSKY), A., i, 472.
- condensation of, with benzil (JAPP and LANDER), P., 1896, 109.
- isobutylic* salt, condensation of, with benzaldehyde (PETRENKO-KRITSCHENKO and ARZIBASCHEFF), A., i, 671.
- ethylic salt, action of ethylic orthoformate on (CLAISEN), A., i, 464.
- substituted, derivatives of alkylic salts, action of phosphorous pentachloride on (PETRENKO-KRITSCHENKO, PISSARSCHEWSKY, and HERSCHKOWITSCH), A., i, 134.
- Acetonesemicarbazone, products of distillation of (THIELE and HEUSER), A., i, 208; (SCHOLTZ), A., i, 343.
- action of hydrogen cyanide on (THIELE and HEUSER), A., i, 340.
- zinc chloride compound of (THIELE and HEUSER), A., i, 208, 209.
- Acetonetetrazylhydrazone (THIELE and INGLE), A., i, 107.
- Acetonitrile from magnesium nitrite and acetic anhydride (EMMERLING), A., i, 591.
- and acetic acid, action of hydrogen chloride on (COLSON), A., i, 282.
- and propionic acid, action of hydrogen chloride on (COLSON), A., i, 282.
- Acetonylaetic acid. See Levulinic acid.
- Acetonylaetone, action of potassium cyanide and hydrochloric acid on (ZELINSKY and ISAJEFF), A., i, 413.
- Acetonyl-*o*-benzoic sulphinide (ECKENROTH and KLEIN), A., i, 304.
- brom- (ECKENROTH and KLEIN), A., i, 304.
- hydrazone of (ECKENROTH and KLEIN), A., i, 304.

- Acetonylcarbamide and its anrochloride (HEILPERN), A., i, 603.
- Acetonylmalic acid, barium, silver, and phenylhydrazine salts (RUHEMANN and TYLER), T., 534; P., 1896, 74.
- Acetonylsuccinic acid (EMERY), A., i, 413, 414.
- Acetonylsuccinic anhydride (EMERY), A., i, 413.
- Acetophenone, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1091, 1092, 1200, 1243.
- condensation of, with benzaldehyde (v. KOSTANECKI and ROSSBACH), A., i, 556.
- condensation of, with benzylideneacetophenone (v. KOSTANECKI and TAMBOR), A., i, 557.
- condensation of, with furfuraldehyde (KOSTANECKI and PODRAJANSKY), A., i, 688.
- condensation of, with salicylaldehyde and with bromosalicylaldehyde (KOSTANECKI), A., i, 240; (KOSTANECKI and OPPELT), A., i, 241.
- Acetophenone, cyan-, thermochemical data of (GUINCHANT), A., ii, 465.
- o*-nitro-, reduction of, by aluminium (WISLICENUS), A., i, 298, 672.
- condensation of, with benzaldehyde (ENGLER and DORANT), A., i, 49.
- sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- Acetophenonehydrazone, action of formaldehyde on (WALKER), T., 1286.
- Acetophenonetetrahydrazone (THIELE and INGLE), A., i, 107.
- Acetophenyl-*m*-nitrobenzylidenhydrazone (WALTHER), A., i, 542.
- Acetophenyl-*p*-nitrobenzylidenhydrazone (WALTHER), A., i, 542.
- α -Acetophenylsemicarbazide (WIDMAN), A., i, 629.
- chloro- (WIDMAN), A., i, 629.
- Acetophenylthiocarbamide, action of acetic chloride on (DORAN), T., 343.
- action of ethylic chlorocarbonate on (DORAN), T., 343.
- Acetophthalylhydroxylamine. See Phthalylacetoxyamine.
- Acetopicolinic acid, β -*di*-chlor- (ZINCKE and WINZHEIMER), A., i, 500.
- β -*tri*-chlor- (ZINCKE and WINZHEIMER), A., i, 500.
- Acetopiperidide, *tri*-chlor- (FRANCHIMONT and TAVERNE), A., i, 602.
- Acetotartaric- β -naphthalide (GASSMANN), A., i, 487.
- Acetotetrahydro- β -naphthylamine, cyano- (BENEDICENTI), A., i, 488.
- Aceto-*o*-toluidide sodium ethoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- sodium methoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- Aceto-*p*-toluidide sodium methoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- sodium methoxide (COHEN and ARCHDEACON), T., 93; P., 1896, 8.
- action of bromine on (VAUBEL), A., i, 157.
- Acetotrinitro-*m*-ethoxyphenylhydrazine, (PURGOTTI), A., i, 363.
- Acetoxime, brom- and iod- (SCHOLL and MATTHAIPOULOS), A., i, 520, 521.
- chlor-, and the action of nitric peroxide on it (SCHOLL and MATTHAIPOULOS), A., i, 520.
- Acetoxycetyldihydrocarboxime (WALLACH), A., i, 571.
- 2-Acetoxybenzylideneacetone, 5-bromo-. See Acetic acid, 2-Hydroxybenzylideneacetone salt of, 5-bromo-.
- 4 : 1-Acetoxybromonaphthalene (REVERDIN and KAUFFMANN), A., i, 175.
- w*-Acetoxycis- π -camphanic acid (KIPPING), T., 949; P., 1896, 115.
- π -Acetoxycamphoric anhydride (KIPPING), T., 940; P., 1896, 115.
- 1 : 4-Acetoxychloronaphthalene (REVERDIN and KAUFFMANN), A., i, 175.
- 5-Acetoxy-1 : 3-dimethylcyclohexene (KNOEVENAGEL), A., i, 287.
- 3 : 1 : 5-Acetoxydiphenyltriazole (WIDMAN), A., i, 630.
- 1'-Acetoxyindole-2'-carboxylic acid (REISSERT), A., i, 390.
- 1 : 2 : 4-Aceto-*m*-xylidide, brom- (VAUBEL), A., i, 646.
- 1 : 3 : 4-Aceto-xylidide, 2 : 5-*d*-nitro- (KLAGES), A., i, 291.
- Acetoxymaleic anhydride (MICHAEL and BUCHER), A., i, 85.
- from oxalacetic acid (MICHAEL and BUCHNER), A., i, 599.
- 5-Acetoxy-1-methyl-3-isobutylcyclohexene (KNOEVENAGEL), A., i, 287.
- 3-Acetoxy-1 : 4-methylcyclohexene (KNOEVENAGEL), A., i, 287.
- 5-Acetoxy-1-methyl-3-hexylcyclohexene (KNOEVENAGEL), A., i, 287.
- 5-Acetoxy-1-methyl-3-isopropylcyclohexene (KNOEVENAGEL), A., i, 287.
- Acetoxoxamide, and action of acetic anhydride on (SCHIFF and MONSACCHI), A., i, 209.

- Acetoxy-oxydimethylnaphthalene (CANNIZZARO and ANDREOCCI), A., i, 489.
- 3 : 1 : 5-Acetoxyphenylisopropyltriazole (WIDMAN), A., i, 630.
- Acetoxypinole dibromide (WALLACH), A., i, 102.
- Acetoxyquinacridone and its trinitro-derivative (NIEMENTOWSKI), A., i, 261.
- Acetoxytetramethyldehydrohaematoxylin (HERZIG), A., i, 379.
- Acetoxytrimethyldehydrobrazilin (HERZIG), A., i, 379.
- Acetoxytrimethylsuccinic anhydride and the corresponding anil, *p*-tolil, and *p*-tolilic acid (AUWERS and v. CAMPENHAUSEN), A., i, 525.
- Acetyl derivatives of aromatic hydrocarbons, preparation of (MEYER and BAUM), A., i, 288; (MEYER), A., i, 433.
- Acetyl groups, estimation of (MEYER), A., ii, 226.
- Acetylacetone, refraction equivalents at different temperatures of (PERKIN), P., 1895, 199; T., 2.
- thermochemical data of (GUINCHANT), A., ii, 12.
- Acetylacetone, nitroso- (ZANETTI), A., i, 249.
- sodio-, action of amylenic bromide on (BARBIER and BOUVEAULT), A., i, 638.
- dithio-, action of carbonyl chloride on (VAILLANT), A., i, 591.
- Acetylacrylic acid, ethylic salt, action of ethylic sodiomalonate on (EMERY), A., i, 414.
- Acetylalbumose (SCHRÖTTER), A., i, 515.
- Acetylallophanic acid, ethylic salt, action of ammonia on (OSTROGOVICH), A., i, 530.
- Acetylammoresinotannol (Luz), A., i, 249.
- Acetylaurins (HERZIG), A., i, 486.
- Acetylbebirine, formation and properties of (SCHOLTZ), A., i, 710.
- Acetylbenzantialdoxime. See Acetic acid, benzantialdoxime salt of.
- Acetylbenzyl methyl ketone, oxime of (KOLB), A., i, 577.
- Acetylbenzylrosinduline chloride (KEHRMANN and TIKHVINSKY), A., i, 511.
- Acetylbiuret (OSTROGOVICH), A., i, 530.
- Acetylbisnitrosodimethylnaphthalene (CANNIZZARO and ANDREOCCI), A., i, 489.
- Acetyl- π -bromo- α -isonitrocamphor (LAPWORTH and KIPPING), T., 320.
- u*-Acetylbutylic alcohol, anhydride of, and its phenylhydrazone, oxime, and benzoate (LIPP), A., i, 317.
- α -Acetyl- α -iso-butylsuccinic acid, ethylic salt, and the action of sulphuric acid on (AUWERS and SCHIFFER), A., i, 644.
- γ -Acetylbutyric acid (BENTLEY and PERKIN), T., 1511.
- action of nitric acid on (BENTLEY and PERKIN), T., 1512; P., 1896, 169.
- oxime of (BENTLEY and PERKIN), T., 1512; P., 1896, 169.
- semicarbazone of (BENTLEY and PERKIN), T., 1513; P., 1896, 169.
- Acetylcallitric acid (BALZER), A., i, 494.
- Acetylcannabinol (WOOD, SPIVEY, and EASTERFIELD), T., 545; P., 1896, 76.
- Acetylcarbazole, dibrom- (MAZZARA and LEONARDI), A., i, 393.
- chlorobrom- (LAMBERTI-ZANARDI), A., i, 304.
- chloronitro- (LAMBERTI-ZANARDI), A., i, 651.
- Acetylcardol ((SPIEGEL and DOBRIN), A., i, 653.
- Acetylchironol (BAUR), A., i, 57.
- Acetylcyanthenylamidoxime (SCHMIDTMANN), A., i, 458.
- Acetyldibenzylhydrazine (CURTIUS and QUEDENFELDT), A., i, 29.
- Acetyldicyanacetic acid, methylic and ethylic salts (GUINCHANT), A., i, 594.
- Acetyldiduroquinone (RÜGHEIMER and HANKEL), A., i, 688.
- Acetyldihydrodiduroquinone (RÜGHEIMER and HANKEL), A., i, 688.
- 2-Acetyl-1 : 1'-dihydroxy-3 : 3'-dimethylnaphthalene, behaviour of, towards sulphuric acid (COLLIE and WILLSMORE), T., 298; P., 1896, 47.
- Acetyl-1 : 2-dihydroxyflavone (FRIEDLÄNDER and RUDT), A., i, 440.
- 6-Acetyldurene (MEYER), A., i, 433.
- 6-Acetylisodurene (BAUM and MEYER), A., i, 228.
- behaviour towards hydroxylamine (BAUM), A., i, 222.
- non-formation of an oxime or hydrazone by (MEYER), A., i, 433.
- Acetylene, synthesis from carbon and hydrogen of (BONE and JERDAN), P., 1896, 62.
- formation of, from lithium carbide (MOISSAN), A., ii, 419.
- luminosity of hydrocarbon flames due to (LEWES), T., 226; P., 1896, 1.
- as an illuminating agent (TROUVÉ), A., i, 633.

- Acetylene as a photometric unit (VIOLETTE), A., ii, 347.
 electrolytic conductivity of aqueous solutions of (JONES and ALLEN), A., ii, 462.
 temperature of the flame of (LEWES), A., ii, 141.
 decomposition of, by shock (MAQUENNE), A., ii, 87.
 oxidation of, by palladinised copper oxide (CAMPBELL), A., ii, 171.
 limited combustion of, with air and oxygen (LE CHATELIER), A., i, 271.
 explosive mixtures of air and (CLOWES), P., 1896, 143.
 action of water on (DESGREZ), A., i, 2.
 action of, on iron, nickel, and cobalt (MOISSAN and MOUREU), A., i, 585.
 physiological action of (ROSEMANN), A., ii, 492.
 poisonous action of (GRÉHANT, BERTHELOT, MOISSAN), A., ii, 200.
 action of, on animals and on blood (BROCINER), A., ii, 264.
 estimation of, in air (CLOWES), P., 1896, 144.
 Acetylene, diiod-, action of light or heat on (MEYER and PEMSEL), A., i, 517.
 Acetylenedicarboxylic acid, action of water on (DESGREZ), A., i, 2.
 ethylic salt, action of ethylic iodide and zinc on (MICHAEL), A., i, 597.
 conversion into ethylic *as* diethoxysuccinate, ethylic ethoxymaleate (MICHAEL and BUCHNER), A., i, 599.
 Acetylfluorescein ethyl ether (quinoidal) (HERZIG and MEYER), A., i, 237.
 Acetyl-3-fluoresceincarboxylic acid (GRAEBE and LEONHARDT), A., i, 438.
 Acetylglutaric acid, ethylic salt, and hydrolysis of (BENTLEY and PERKIN), T., 1511; P., 1896, 169.
 β -Acetylglutaric acid, identity of, with isopropylidenesuccinic acid (EMERY), A., i, 414.
 β -Acetylglutaric anhydride (EMERY), A., i, 413.
 Acetyl-1 : 4 : 3-hydroxyquinolinequinone (ZINCKE and WINZHEIMER), A., i, 499.
 Acetylia. See Diethylenediamine.
 1'-Acetylisoindazole (AUWERS and EWING), A., i, 504.
 Acetylin dileucin (SCHUNCK and MARCHLEWSKI), A., i, 96.
 1'-Acetylin dophenazine, 1 : 3-dibromo- (SCHUNCK and MARCHLEWSKI), A., i, 236.
 Acetylisatin, condensation of, with *o*-phenylenediamine (SCHUNCK and MARCHLEWSKI), A., i, 235.
 dioxime of (SCHUNCK and MARCHLEWSKI), A., i, 236.
 Acetyl-*d*-lactic acid, rotatory power of the ethylic salt of (PURDIE and WILLIAMSON), T., 828; P., 1896, 97.
 Acetylactylacetamide (COLSON), A., i, 283, 284.
 Acetyluteolin triethyl ether (PERKIN), T., 801; P., 1896, 105.
 Acetylmalic acid, methylic salt, specific rotation of (PURDIE and WILLIAMSON), T., 824; P., 1896, 97.
 rotatory power of the methylic, ethylic, propylic, and *iso*-butyric salts of (WALDEN), A., ii, 136.
 Acetylmalic acid, brom-, rotatory power of the methylic, ethylic, propylic, and *isobutyric* salts of (WALDEN), A., ii, 136.
 chlor-, rotatory power of the methylic, ethylic, and propylic salts of (WALDEN), A., ii, 136.
 Acetylmalonic acid, thermochemical data of the methylic salt of (GUINCHANT), A., ii, 12.
 Acetylmandelic acid, rotatory power of (WALDEN), A., ii, 138.
 methylic salt, rotatory power of (WALDEN), A., ii, 138.
 Acetylmesitylene, reduction of (MEYER and SOHN), A., i, 434.
 behaviour towards phenylhydrazine and nitric acid (BAUM), A., i, 222.
 Acetylmetasantonie acid (FRANCESCONI), A., i, 378.
 Acetylmethylallyldithionurazole (FREUND and HEILBRUN), A., i, 415.
 1-Acetyl-3-methylindophenazine (SCHUNCK and MARCHLEWSKI), A., i, 236.
 Acetylmorin tetramethyl ether (PERKIN and BABLICH), T., 797; P., 1896, 106.
 Acetylnaphthylphenylcarbazole (SCHÖPFF), A., i, 244.
 Acetylnaphthylphenylcarbazolecarboxylic acid (SCHÖPFF), A., i, 243.
 Acetylpentamethylbenzene, behaviour of, towards hydroxylamine (BAUM), A., i, 222.
 Acetylpeonol, brom-. See Acetic acid, peonol salt of, bromo-.
 Acetylphenimeisatin, amino- (SCHUNCK and MARCHLEWSKI), A., i, 236.

- 2-Acetyl-3-phenylindazole (AUWERS and SANDHEIMER), A., i, 505.
- 1' : 3'-Acetylphenylisindazole and its acetate (AUWERS and EWING), A., i, 504.
- Acetylphenylmalic acid and its salts (RUHEMANN and WOLFF), T., 1385 ; P., 1896, 166.
- Acetylphenylpyrazolidine (HARRIES and LOTH), A., i, 321.
- 2 : 1 : 3-Acetylphenylpyrazolone (HARRIES and LOTH), A., i, 321.
- Acetylphorone, behaviour of, towards phosphoric anhydride (KERP), A., i, 448.
- β -Acetylpropionic acid. See Levulinic acid.
- 1 : 4-Acetylisopropylcyclopentan-2-one (*acetylisopropylketopentamethylene*), copper derivative and dioxime of (VON BAEYER), A., i, 248.
- Acetylpyridineacetoxime and its aurochloride and platinumchloride (KNUTTEL), A., i, 497.
- Acetylisorhamnetin (PERKIN and HUMMEL), T., 1569 ; P., 1896, 186.
- Acetylrosinduline (KEHRMANN and HERTZ), A., i, 509.
- Acetylsagaresinotannol (HOHENADEL), A., i, 58.
- Acetylsandaracolic acid (BALZER), A., i, 493.
- Acetylsantonin acid (FRANCESCONI), A., i, 377.
- Acetylscopolcine (MERCK), A., i, 65.
- Acetyltetrahydrocarvylamine (WALLACH and HERBIG), A., i, 101.
- Acetyltetrahydroquinine (LIPPMANN and FLEISSNER), A., i, 63.
- Acetyltricarballic acids, action of hydrochloric acid on (EMERY), A., i, 413.
- Acetyltrimethylhæmatoxylin, acetyl derivative of (HERZIG), A., i, 379.
- Acetyltropeine (MERCK), A., i, 65.
- Acetylurethane, action of carbamide on (OSTROGOVICH), A., i, 262.
- Acetylxylin (BADER), A., i, 335.
- Acetyl. See further Diacetyl, Triacetyl, &c.
- Achroodextrin. See under Dextrin.
- Achyranthes, red dye of (WEIGERT), A., i, 388.
- Acid $C_4N_3H_3O_5$, from benzeneazimidole (ZINCKE), A., i, 430.
- $C_6H_{10}O_4$, from campholenic acid and its anhydride, ethylic salt, and anilido- and phenylimido-derivatives (BÉHAL), A., i, 55.
- $C_7H_{12}O_4$, from oxidation of campholenic acid (BÉHAL), A., i, 55, 179.
- Acid $C_8H_7NO_3$, obtained by the action of chloroform and potash on *m*-aminobenzoic acid, and its barium salt (ELLIOTT), T., 1515 ; P., 1896, 171.
- $C_8H_{10}O_3$, from ethylic sodioacetoacetate and β -bromlevulinate (EMERY), A., i, 638.
- $C_8H_{12}O_4$, from oxidation of pinonic acid (WAGNER and ERTSCHIKOWSKY), A., i, 380.
- $C_8H_{12}O_5$, from oxidation of camphoric acid : constitution of (BALBIANO), A., i, 493.
- $C_8H_{14}O_4$, from oxidation of isophorone (KERP), A., i, 448.
- $C_9H_{14}O_3$, from potassium *allo*ethylic camphorate : its phenylhydrazone (WALKER and HENDERSON), T., 755 ; P., 1896, 110.
- $C_{10}H_{16}O_3$, from α -bromocampholide, barium salt (FORSTER), T., 51.
- $C_{10}H_{16}O_3$, from oxidation of hydrocarbon arising from pinene tetrabromide (TILDEN and NICHOLLS), P., 1896, 139.
- $C_{10}H_{15}O_4$, from dibromocampholide : its barium salt, *dibromo*-derivative (FORSTER), T., 44 ; P., 1895, 208.
- $C_{10}H_{16}O_6$, from bromocamphorenic acid, and its silver salt (FORSTER), T., 49 ; P., 1895, 208.
- $C_{10}H_{18}O_3$, from campholide : its barium salt (FORSTER), T., 57 ; P., 1895, 209.
- $C_{10}H_{19}NO_4$, from nitromenthone (KONOVALOFF), A., i, 177.
- $C_{11}H_6Br_3O_6$, from 3 : 1'-dibromo-1 : 2 : 3'-naphthiaquinonecarboxylic acid (ZINCKE), A., i, 308.
- $C_{15}H_{16}S_6O_8$, from hydrolysis of thiorufic acid (EMMERLING), A., i, 127.
- $C_{15}H_{20}O_2$, from camphoric anhydride and benzene ; and its methylic and ethylic salts, anhydride, amide, phenylhydrazide (BURKER), A., i, 179.
- $C_{18}H_{16}ClIO_4$, from phenyliodohydrylic acid (ERLENMEYER), A., i, 303.
- $C_{22}H_{15}O_4N$ or $C_{24}H_{15}O_6N$, from ammonium 1 : 4' - naphthalenedicarboxylate : its silver, calcium, barium salts, and amide (MORO), A., i, 568.
- $C_{23}H_{22}N_2O_3$, formed from benzylidene-*p*-toluidine by action of alcoholic potassium cyanide : its anhydride and nitrile (MILLER and PLÖCHL), A., i, 609, 610.
- $C_{26}H_{18}O_2$, from tetraphenylene-pinaco-

lin with alcoholic potash (KLINGER and LONNES), A., i, 691.

Acid $C_{26}H_{18}O_3$, from acid $C_{26}H_{18}O_2$ on oxidation (KLINGER and LONNES), A., i, 691.

$C_{27}H_{20}O_3$, from benzilic acid (KLINGER and LONNES), A., i, 375.

$C_{40}H_{30}O_4$, and its potassium and methylic salts (KLINGER and LONNES), A., i, 374.

Acid, amount of, produced during germination (CLAUDEL and CROCHETELLE), A., ii, 443.

Acid, amido-, obtained in the preparation of 3-sulphamidobenzamide, 5-bromo- (BOETTINGER), A., i, 438.

Acid chlorides, general method for the preparation of (COLSON), A., i, 282.

action of zinc fluoride on (MESLANS and GIRARDET), A., i, 346.

Acids, action of, on human metabolism (DUNLOP), A., ii, 484.

identification and isolation of, in plants (LINDET), A., ii, 539.

Acids, amido-, substituted, preparation of, from ethylic amidoacetate hydrochloride, anhydrous sodium carbonate, and an acid anhydride (RADENHAUSEN), A., i, 137.

Acids, aromatic etherification of (MEYER), A., i, 170.

Acids, dicarboxylic, $C_7H_{12}O_4$, general review of (AUWERS), A., i, 639.

Acids, fatty, from seeds from I'Sano (HÉBERT), A., i, 633.

in the oil from capsicum seeds (VON BITTÓ), A., ii, 209.

products of electrolysis of (HAMONET), A., i, 664.

monocarboxylic, electrolytic synthesis of (VON MILLER and HOFER), A., i, 10, 11.

volatility of, laws deduced from (RICHMOND), A., ii, 280.

behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.

compounds of, with sulphur (HENRIQUES), A., i, 204.

compounds of, with cholesterol in blood (HÜRTHE), A., ii, 485.

separation of solid and liquid (DE KONINGH), A., ii, 226.

Acids, insoluble, estimation of, in butter (BEAL), A., ii, 129.

Acids, volatile, estimation of, in butter (BEAL), A., ii, 129.

estimation of, in spirits, &c. (DUCLAUX), A., ii, 504.

Acids, α -hydroxy-, action of chloral on (EDELEANU and ZAHARIA), A., i, 348.

Acids, inorganic and organic, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

Acids, mercapto-, action of haloid fatty acids on (LOVÉN), A., i, 412, 413.

Acids of the acetylene series, action of acetic anhydride on (MICHAEL and BUCHER), A., i, 85.

Acids, secondary β -hydroxy-, formation of (REFORMATSKY), A., i, 128.

Acids, unsaturated $\gamma\delta$, action of sodium hydroxide on (SPENZER), A., i, 127, 128.

preparation of bromine additive compounds of (MICHAEL), A., i, 131.

Acids, vegetable, action of, on insoluble phosphates in presence of nitrates (LOGES), A., ii, 621.

Acids (or their salts or derivatives).

Sec also:—

Acetic acid.

Acetic acid, cyan-.

Acetic- α -sulphonepropionic acid.

Acetic- β -sulphonepropionic acid.

Acetoacetic acid.

Acetoacetic acid, cyan-.

Acetochloropyridinecarboxylic acid, dichlor-.

Acetomenthoximic acid.

Acetonedicarboxylic acid.

Acetonylmalic acid.

Acetonylsuccinic acid.

Acetopicolinic acid.

Acetoxycamphanic acid.

Acetylallophanic acid.

y-Acetylbutyric acid.

Acetylcallitrolic acid.

Acetyldicyanacetic acid.

Acetylenedicarboxylic acid.

Acetyl-*d*-lactic acid.

Acetylmalic acid.

Acetylmalonic acid.

Acetylmandelic acid.

Acetylphenylmalic acid.

Acetylsandaracolic acid.

Acetylsantonin acids.

Aconitic acid.

Acrylic acid.

Allylacetic acid.

Allylmalonic acid.

Allylpropanetricarboxylic acid.

Amylacetic acid.

3'-Amyl-2'-hexylquinoline-1-carboxylic acid.

iso-Amylmalonic acid.

Amylsulphamic acid.

Anemonin.

Anhydracetonebenzilcarboxylic acid.

Anhydrocamphoic acid.

Anhydrocamphoronic acid.

Acids. See :—

Anhydrodibenzylacetoacetic acid.
 Anhydrotetronic acid.
 Anilidobenzoic acid.
 β -Anilidopropionic acid.
 Aniline-*o*-sulphonic acid.
 Aniline-*m*-sulphonic acid.
 Anisic acid.
 Anisoilphthaloylic acid.
 Anisoylcarboxylic acid.
 Anisoylglyoxylic acid.
 Anisuric acid.
 Anthraquinonecarboxylic acid.
 Apioleketonic acid.
 Apioleic acid.
 Apophyllenic acid.
 Arabonic acid.
 Arachidic acid.
 Aristidinic acid.
 Aristinic acid.
 Aristolic acid.
 Aristolochic acid.
 Aspartic acid.
 Atranoric acid.
 Azelaic acid.
 Azimidobenzoic acid.
 Azimidoethylenedicarboxylic acid.
 Azimido-*m*-uramidobenzoic acid.
 Azimido-*p*-uramidobenzoic acid.
 Azinemethanedisulphonic acid.
 Azoacetic acid.
 Azurilic acid.
 Behenoxylic acid.
 Benzaldoximidoacetic acid.
iso-Benzaldoximidoacetic acid.
 Benzamidodisulphonic acid.
 Benzeneazocyanacetic acid.
 Benzeneazosalicyclic acid.
 Benzenediazosulphonic acid.
 Benzenesulphinic acid.
 Benzenesulphonic acid.
 Benzilic acid.
 Benzoic acid.
 Benzoindicarboxylic acid.
 Benzothiazolecarboxylic acid.
 Benzoylacethydroxamic acid.
 Benzoylacetic acid.
 Benzoylallophanic acid.
 Benzoylbenzoic acid.
p-Benzoylbenzoic acid.
p-Benzoyl-*p*-benzoylbenzoic acid.
 Benzoyl-*o*-ethoxybenzoic acid.
 Benzoylethylnitrolic acid.
 Benzoylglutaric acid.
 Benzoylglyceric acid.
 Benzoylhydrazonacetoacetic acid.
 Benzoylphthalic acid.
 Benzoyl*isophthalic* acid.
 Benzoylpropionic acid.
 Benzoylsalicyclic acid.
 Benzoylsandaracolic acid.
 Benzoyl-*d*-santonous acid.

Acids. See :—

Benzoylsantonous acid, racemic.
 Benzoyltetronic acid.
 Benzoyltoluic acids.
 α -Benzoyltricarballic acid.
 β -Benzylcrotonic acid.
 β -Benzyl-*iso*-crotonic acid.
 Benzyl-desmotroposantonous acid.
 Benzylideneacetoacetic acid.
 Benzylideneaminophenylimido- β -butyric acid.
 Benzylidenehydrazido*isobutyric* acid.
 Benzylidenehydrazinecarboxylic acid.
 Benzylmalonic acid.
 β -Benzylloxycrotonic acid.
l-Benzylsantonous acid.
 Benzyl-*o*-sulphamidobenzoic acid.
 Brassylic acid.
cyclo-Butane-1 : 3-dioxalylic acid.
 $\alpha\gamma\gamma$ -Butanetricarboxylic acid.
iso-Butylanhydrodibenzilacetoacetic acid.
 Butyric acid.
iso-Butyric acid.
 Butyrophenone-*o*-carboxylic acid.
 Butyroylmalic acid.
iso-Butyroylmalic acid.
iso-Butylmalonic acid.
 Callitrolic acid.
 Camphanic acid.
cis- π -Camphanic acid.
 Camphenephosphonic acid.
 Camphensulphonic acid.
 Camphenylic acid.
 Camphoic acid.
 Campholenic acid.
 Campholic acid.
allo-Campholytic acid.
cis-Campholytic acid.
 Camphopyranilic acid.
 Camphopyric acid.
 Camphoramic acid.
 Camphorenic acid.
 Camphoric acid.
 Camphoronamic acid.
 Camphoronic acid.
iso-Camphoronic acid.
 Camphoronimic acid.
 Camphorsulphonic acid.
 Camphotricarboxylic acid.
 Caproic acid.
 Carbethoxyacethydroxamic acid.
 Carbethoxyethylnitrolic acid.
 4-Carboxamidobenzoic acid, 3-amino.
 Carboxyacetonylsuccinic acid.
 Carboxyethylthiocarbamic acid.
 Carboxyphenylmalonic acid.
 Cardenic acid.
 Cardic acid.
 Cardolic acid.
 Carnaubic acid.
 Carnic acid.

Acids. See:—

Caronebisnitrosylic acid.
 Cerotic acid.
 Chironolic acid.
 Chloralic acid.
d-Choleic acid.
 Cholic acid.
 Chromoxalic acid.
 Cincholeuponic acid.
 Cinchomeronic acid.
iso-Cinnamenylmandelic acid.
 Cinnamic acid.
 Citraconic acid.
 Citradibromopyrotartranilic acid.
 Citrazinic acid.
 Citric acid.
 Citronellic acid.
 Columbic acid.
 Crotonic acid.
iso-Crotonic acid.
iso-Coumarincarboxylic acid.
 Cumenesulphonic acid.
 Cuminic acid.
 Cyanacetic acid.
 Cyanuric acid.
iso-Cyanuric acid.
 Cymenecarboxylic acid.
 Cymenesulphonic acid.
 Cymylglyoxylic acid.
 Decoic acid.
 Deoxyamalic acid.
 Deoxycholeic acid.
 Desmotropodisantonous acid.
 Desmotroposantonous acid.
 Desoxalic acid.
 Desylacetic acid.
 Desyleneacetic acid.
 Diacetoacetic acid.
 Diacetylgeric acid.
 Diacetyltartaric acid.
 Diallylacetic acid.
 Dialuric acid.
 Diaminobenzenesulphonic acid.
 Diazoacetic acid.
 Diazoaminosulphanilic acid.
 Diazobenzenephnylhydrazonemethanedisulphonic acid.
p-Diazobenzenesulphonic acid.
iso-Diazobenzenesulphonic acid.
 Diazomethanedisulphonic acid.
 Diazoniumanthranilic acid.
 Diazophenolcarboxylic acid.
 Diazophenolsulphonic acid.
 Diazosalicylic acid.
 Diazosulphanilic acid.
 Dibenzamidodianilidosuccinic acid.
 Dibenzenesulphonhydroxylamic acid.
 Dibenzoylacetohydroxamic acid.
 Dibenzoylbenzhydroxamic acid.
 Dibenzoylbenzoic acid.
 Dibenzoylgeric acid.
 Dibenzoylphenylacetic acid.

Acids. See:—

Dibenzoyltartaric acid.
 Dibenzylacetic acid.
 Dibenzylacetoacetic acid.
 Dibenzylecyanoacetic acid.
 Dibenzylmalonic acid.
 Dicarboxyphenylglyoxylic acid.
 Didchydroketocampholenic acid.
 2 : 4-Diethoxybenzoic acid.
 2 : 4-Diethoxybenzoylformic acid.
 Diethoxybutyric acid.
 2 : 4-Diethoxymandelic acid.
 Diethoxyquinonedimalonic acid.
 Diethoxysuccinic acid.
 Diethylaminohexahydrotoluic acid.
exo-Diethylamino-*o*-toluic acid.
exo-Diethylamino-*p*-toluic acid.
 Diethyldicarboxyglutaric acid.
aa-Diethylglutaric acid.
 Diglycollic acid.
 Dihydraerylic acid.
 Dihydro-*cis*-campholytic acid.
 Dihydrocuminic acid.
 Dihydrophthalic acid.
 Dihydropolystichic acid.
 Dihydroxyadipic acid.
 Dihydroxydimethylglutaric acid.
 Dihydroxydiphenylaminecarboxylic acid.
 Dihydroxydiphenylglutaric acid.
 Dihydroxymaleic acid.
 Dihydroxynaphthalenesulphonic acid.
 Dihydroxynaphthoic acid.
 2 : 6-Dihydroxypyridine-4-carboxylic acid.
 Dihydroxystearic acid.
 Dihydroxysulphonaphthoic acid.
 Dihydroxytetraphenylethanedicarboxylic acid.
 Diketotetrahydroquinazoline-2-carboxylic acid.
 Dilactylic acid.
 2 : 3-Dimethoxybenzoic acid.
 3 : 4-Dimethoxybenzoic acid.
 Dimethoxytriphenylcarbinolcarboxylic acid.
 Dimethoxytriphenylmethanecarboxylic acid.
 Dimethylacrylic acid.
 Dimethylanilinesulphonic acid.
 Dimethylapionolcarboxylic acid.
 Dimethylazammoniumbenzoic acid.
 Dimethylbenzoic acid.
 Dimethylbenzoylpropionic acid.
 Dimethylcarballylic acid.
aa-Dimethylecyanosuccinic acid.
 Dimethylecyanuric acid.
 Dimethylenegluconic acid.
 Dimethylethylsuccinic acid.
 Dimethylfumaric acid.
aa-Dimethylglutaric acid.
αβ-Dimethylglutaric acid.

acids. See :—

Dimethylmaleic acid.
 Dimethylmalonic acid.
 Dimethylnaphthaquinonepropionic acid.
 Dimethyloctanoic acid.
 2 : 6-Dimethyloctane-3-onoic acid.
 2 : 6-Dimethyl-3-oximidoctanoic acid.
 2 : 6-Dimethylpiperidine-3 : 5-dicarboxylic acid.
 Dimethylpropanetricarboxylic acid.
 Dimethylpropylsuccinic acid.
 Dimethylprotocatechuic acid.
 1 : 4-Dimethylpyrazolone-4-carboxylic acid.
 2 : 6-Dimethylpyridine-4 : 5-dicarboxylic acid.
 Dimethylsuccinic acid.
 Dimethyltetrahydropyrrolicdicarboxylic acid.
 Dimethyltricarballic acid.
 Dimethyluric acid.
 Dimethylvioluric acid.
 -Dinaphthalidocitric acid.
 Diphenacetylmalonic acid.
 Diphenazone-*o*-hydroxycarboxylic acid.
 Diphenoxyanilic acid.
 Diphenoxydiethylacetic acid.
 Diphenoxydiethylmalonic acid.
 Diphenoxyethylmalonic acid.
 Diphenoxyhexoic acid.
 Diphenylacetyl glyceric acid.
 Diphenylallophtanic acid.
 γ -Diphenylbutyric acid.
 Diphenylcarbazidedicarboxylic acid.
 Diphenyldiphenylenepropionic acid.
 Diphenyleneglycollic acid.
 Diphenylfumaric acid.
 Diphenylitaconic acid.
 Diphenylmaleic acid.
 Diphenyloxetonecarboxylic acid.
 Diphenylparaconic acid.
 Diphenylcyclopentenonylacetic acid.
 2 : 6-Diphenylpyrazine-2 : 4-dicarboxylic acid.
 Diphenylsuccinic acid.
 Diphenyltetrahydropyrrolicdicarboxylic acid.
 Diphenylthiophthaluric acid.
 Dipropionylglyceric acid.
iso-propyloxalic acid.
i-iso-propylsuccinic acid.
 Disantonous acid.
 Disantonous acid.
 santonous acid, inactive.
p-, *m*-, Ditoluytartaric acids.
 Valeryl tartaric acid.
 Vinissic acid.
 Vinencarboxylic acid.
 -Durenecarboxylic acid.
 Vinidic acid.

Acids. See :—

Ellagic acid.
 Ethanetetracarboxylic acid.
 Ethanetricarboxylic acid.
 Etherthiorufic acid.
 Ethoxyennamic acid.
 Ethoxyerotonic acid.
 Ethoxyfumaric acid.
 Ethoxyglutaconic acid.
 Ethoxymaleic acid.
 Ethoxyphenylmalonamic acid.
 Ethoxyphenyloxamic acid.
 β -Ethoxy- β -phenylpropionic acid.
 Ethoxyphenylsuccinamic acid.
 Ethoxy- β -resorcylic acid.
 Ethoxysuccinic acid.
 Ethylacetonedicarboxylic acid.
 Ethylallylacetic acid.
 Ethylanhydrodibenzilacetoacetic acid.
 Ethylbenzoylpropionic acid.
 Ethyldesmotroposantonous acid.
 Ethylenetetracarboxylic acid.
 Ethylfumaric acid.
 Ethylglycollic acid.
 Ethylideneanthranilic acid.
 Ethylidenepropionic acid.
 Ethylmalonic acid.
 Ethylmesitylenesulphonic acid.
d-Ethylsantonous acid.
l-Ethylsantonous acid.
 Ethylsantonous acid, racemic.
 Ethylsuccinic acid.
p-Ethyltoluenesulphonic acid.
p-Ethyltoluene-*o*-sulphonic acid.
 Ethyl- α -thiocarbonic acid.
 Eugenolacetic acid.
iso-Eugenolacetic acid.
 Fluoresceincarboxylic acid.
 Formazylformic acid.
 Formazylsulphonic acid.
 Formic acid.
 Formyladipic acid.
 Formylmalonuric acid.
 Formylmaluric acid.
 Formyloxaluric acid.
 Formylphenylacetic acid.
 Formylraecumic acid.
 Formylsuccinuric acid.
 Formylthymotic acid.
 Fumaric acid.
 Furazanedicarboxylic acid.
 Furfurylidenemalonic acid.
 β -Galactonic acid.
 Galactonic acid.
 Gallic acid.
 Gallotannic acid.
 Gentisic acid.
 Geranic acid.
 Glucic acid.
apo-Glucic acid.
 Glucoheptonic acid.
 Glycocholic acid.

Acids. See :—

Glycolhydracrylic acid.
 Glycollic acid.
 Glycuronic acid.
 Glyoxylic acid (glyoxalic acid).
 Gorgonic acid.
 Granatic acid.
 Gulonic acid.
 Hæmatic acid.
 Hæmatommenic acid.
 Hæmatommic acid.
 Helianthotannic acid.
 Hemimellitic acid.
 Hemipinamic acid.
 Hendecenoic acid.
 Hendecinoic acid (dehydrohendecenoic acid, undecolic acid).
 Heptane-3 : 3 : 5 : 5-tetracarboxylic acid.
 Heptane- $\alpha\gamma\gamma$ -tricarboxylic acid.
 Heptinenoic acids.
 Heptoic acid.
 Heptylideneanthranilic acid.
 Hexahydrocinchononic acid.
 Hexahydrophenylaminoacetic acid.
 Hexahydroquinolinic acid.
 Hexahydro-*p*-tolnic acid.
 Hexahydro-*p*-xylic acid.
 Hexanetricarboxylic acid.
 3-*cyclo*-Hexanone-1-carboxylic acid.
iso-Hexenoic acid.
 Hexoic acid (caproic acid).
 Hippuric acid.
 Homoaspartic acid.
 Homopiperonylic acid.
 Homopiperonyloxamic acid.
 Homoterpenoylformic acid.
 Homoterpenylic acid.
 Homotropinic acid.
 Hydantoic acid.
 Hydrazinoacetic acid.
 Hydrazinobutyric acid.
 Hydrazinoisobutyric acid.
 Hydrazinocarboxylic acid.
 Hydrazinopropionic acid.
 Hydrazinovaleric acid.
 Hydrazonophenylglyoxylic acid.
 Hydrocarbostyryl-3'-carboxylic acid.
 Hydrocinnamic acid.
 Hydrocyanic acid (under Cyanogen).
o-Hydroxybenzoic acid.
m-Hydroxybenzoic acid.
p-Hydroxybenzoic acid.
 Hydroxycamphanic acid.
 Hydroxycamphoric acid.
 Hydroxycamphoronic acid.
 Hydroxycamphocarboxylic acid.
 Hydroxycamphotricarboxylic acid.
 Hydroxydibromocamphorsulphonic acid.
 Hydroxydimethoxycoumarincarboxylic acid.

Acids. See :—

β -Hydroxy- α -dimethylisohexoic acid.
 β -Hydroxy- α -dimethyl- β -isopropylpropionic acid.
 $\alpha\beta$ -Hydroxydiphenylbutyric acid.
 γ -Hydroxy- $\beta\gamma$ -diphenylbutyric acid.
 2-Hydroxy-2 : 3-diphenylcyclopentenonylacetic acids.
 Hydroxydisulphonaphthoic acid.
 Hydroxyfumaric acid.
 $\alpha\gamma$ -Hydroxyglutaric acid.
 3-Hydroxycyclohexane-1-carboxylic acid.
 β -Hydroxyisohexoic acid.
 Hydroxylaminesuccinylhydroxamic acid.
 Hydroxylaminoacetic acid.
 Hydroxylauronic acid.
 Hydroxymethanetrissulphonic acid.
 β -Hydroxymethyladipic acid.
p-Hydroxy-*m*-methylbenzoic acid.
 5 : 1-Hydroxymethyl-dihydropyridone-3 : 4-dicarboxylic acid.
 Hydroxymethylenephénylacetic acid.
 Hydroxynaphthalenesulphonic acid.
 Hydroxynaphthoic acids.
 Hydroxypentadecoic acid.
 γ -Hydroxy- β -phenoxyethylbutyric acid.
 Hydroxyphenylsuccinamic acid.
 Hydroxypinic acid.
 Hydroxyisopropylglutaric acid.
 4-Hydroxy-1-quinolinesulphonic acid.
 8-Hydroxytetrahydrocarvonebisnitrosylic acid.
 β -Hydroxytetramethylpropionic acid.
exo-Hydroxy-*o*-tolnic acid.
 β -Hydroxy- $\alpha\alpha\beta$ -trimethyladipic acid.
 α -Hydroxytrimethylpropionic acid.
 Hygrie acid.
 Imidocarbonic acid.
 Indole-2'-carboxylic acids.
 Indoxylglycuronic acid.
 Isanic acid.
 Isophthalic acid.
 Itaconic acid.
 Jalapic acid.
 Jalapinic acid.
iso-Ketocamphoric acid.
 Ketoketoximebehenic acid.
 Ketopinic acid.
 $\alpha\gamma$ -Ketopyrhydrindene-carboxylic acid.
 Ketostearic acid.
 Lactic acid, *d*-, *l*-, and *i*.
 Lactylglycollic acid.
 Lactylhydracrylic acid.
 Lanoceric acid.
 Lauranolic acid.
 Laurie acid.
 Lanronic acid.
 Lauronolic acid.

Acids. See :—

Lepidotie acid.
 Levulinic acid.
 Linoleic acid.
 Lithofellic acid.
 Lysuric acid.
 Lyxonic acid.
 Maleic acid.
 Malic acid.
l-Malic acid.
 Malonic acid.
 Mandelic acid.
 Mannonic acid.
 Melissic acid.
 Menthoximic acid.
 Mesaconic acid.
 Mesitylenecarboxylic acid.
 Mesitylenic acid.
 Mesitylglyoxylic acid.
 Mesityloxidoxalic acids.
 Methanedisulphonic acid.
 Methanesulphonopropionic acid.
α-*o*-Methoxyacrylic acid.
β-*o*-Methoxyacrylic acid.
m-Methoxybenzoic acid.
o-Methoxybenzoic acid.
 Methoxyphenylcrotonic acid.
 Methoxyphenylmalonic acid.
 Methoxyphenyloxamic acid.
β-Methoxy-*β*-phenylpropionic acid,
 iodo-.
 Methoxyphenylsuccinamic acid.
 Methylacetoacetic acid.
 Methylacetonedicarboxylic acid.
 Methyladipic acids.
 Methylallylsuccinic acid.
para-Methylallylsuccinic acid.
 Methylazimidobenzoic acid.
 Methylbenzenedicarboxylic acid.
 Methylbenzhydroximic acid.
 Methylbenzoylpropionic acid.
 Methylbutyloxamic acid.
α-Methylbutyric acid.
 Methyl-*β*-camphoramic acid.
 Methylcarbocaprolactonic acid.
para-Methylcarbocaprolactonic acid.
 Methylcitraconic acid.
 Methyl-desmotroposantonous acid.
 2-Methyldihydrofurfuran-3 : 4-dicarboxylic acid.
 2-Methyldihydrofurfuran-3 : 4-dicarboxylic acid.
 2-Methyldihydrofurfuran-3 : 4 : 5-tricarboxylic acid.
p-Methyldihydroxybenzenesulphonic acid.
 5-Methyl-1 : 3-diketocyclohexane-4 : 6-dicarboxylic acid.
 Methyl-diphenylitaconic acid.
 Methyleneacetic acid.
 Methylene-mucic acid.
 Methylene-saccharic acid.

Acids. See :—

Methylenetartaric acid.
 Methylene-thylacetic acid.
 Methylene-thylacroleinanthranilic acid.
 Methylene-thylbenzoylpropionic acid.
 3'-Methyl-2'-ethylquinoline-1-carboxylic acid.
 Methylene-thylsuccinic acid.
 Methylglutaric acid.
h-Methylhexahydrocinchononic acid.
 Methyliminophenylpropionic acid.
 Methylitaconic acid.
 Methylmalonic acid.
 Methylmesaconic acid.
 Methylnoropiananilidic acid.
 Methylnoropianic acid.
 Methylnoropian-*α*-naphthalidic acid.
 Methylnoropian-*β*-naphthalidic acid.
 Methylnoropian-*p*-toluidic acid.
 3-Methylpentamethylene-1-carboxylic acid.
 3-Methylpentamethylene-1 : 1-dicarboxylic acid.
 3-Methylcyclopentanecarboxylic acid.
 3-Methylcyclopentane-1 : 1-dicarboxylic acid.
 Methylisophthalic acid.
β-Methylpicolinic acid.
α-Methylpimelic acid.
n-Methylpipicolinic acid.
 Methylpiperidinecarboxylic acid.
 Methylisopropyladipic acid.
 Methylisopropylbutanetricarboxylic acid.
 Methylisopropylcyclobutanedicarboxylic acid.
 Methylisopropylethanetricarboxylic acid.
 Methylisopropylsuccinic acid.
 Methylisopropyltetramethylenedicarboxylic acid.
 3-Methylpyrazoloneisobutyric acid.
 Methylpyrazolonepropionic acid.
 Methylquinolinecarboxylic acid
 (aniluvitonic acid).
d-Methylsantonous acid.
l-Methylsantonous acid.
 Methylsantonous acid, racemic.
 Methylterephthalic acid.
 Methyltetronic acid.
μ-Methylthiazole-*α*-carboxylic acid.
β-Methylthio-*ψ*-uric acid.
 Methyluric acid.
 Methyl-*iso*-valeric acid.
 Mucic acid.
 Myristic acid.
 Naphthaleneazohydroxynaphthoic acid.
 1 : 3'-Naphthylenediamine-4 : 1'-disulphonic acid.

Acids. See :—

1 : 2-Naphthylenediamine-4-sulphonic acid.
 1 : 3'-Naphthylenediamine-4-sulphonic acid.
 1 : 4'-Naphthylenediamine-2-sulphonic acid.
 Naphthalenedicarboxylic acid.
 Naphthalenedisulphonic acid.
 Naphthalene-3 : 1-disulphonic acid.
 Naphthalenesulphonic acid.
 α -Naphthalidopyrotartaric acid.
 Naphthalidosuccinic acid.
 α -Naphthalidopyruvic acid.
 β -Naphthalidopyruvic acid.
 β -Naphthalidosuccinic acid.
 1 : 2 : 3-Naphthaquinonecarboxylic acid.
 1 : 2 : 3'-Naphthaquinonecarboxylic acid.
 1 : 2-Naphthaquinone-4-sulphonic acid.
 α -Naphthoic acid.
 β -Naphthoic acid.
 Naphtholsulphonic acid.
 β -Naphtho- α -methyleinchoninic acid.
 α -Naphthoylbenzoic acid.
 2 : 1 : 4-Naphthylaminedisulphonic acid.
 2 : 1-Naphthylaminesulphonic acid.
 α - and β -Naphthylglyoxylic acids.
 Naphthylphenylcarbazolecarboxylic acid.
 Naphthylsulphamic acid.
 Neurostearic acid.
 Nipicotinic acid.
 Nitramineacetic acid.
iso-Nitraminepropionic acid.
 Nonoic acid.
 Nopic acid.
 Norpic acid.
 Nucleic acid.
 Octoic acid.
 Octylquinoxalinedodecoic acid.
 Oenanthoic acid.
 Oleic acid.
 Oumatic acid.
 Opiananthranilic acid.
 Opianic acid.
 Opian- β -naphthylamic acid.
 Oxalacetic acid.
 Oxalic acid.
 Oximamidoxalic acid.
 Oximidoacetic-acetic acid.
 Oximidopropionic-acetic acid.
 Oxymenthyllic acid.
 Palmitic acid.
 Papaverinic acid.
 Parabanic acid.
 Pelargylaminoazelaic acid.
 Pelargylaminobrassylic acid.
 Pentamethenylacetic acid.

Acids. See :—

Pentamethenylmalonic acid.
 Pentamethylbenzoylpropionic acid.
 Pentamethylenetetraminebisdiazobenzenesulphonic acid.
 Pentane- $\alpha\gamma\gamma\alpha_1$ -tetracarboxylic acid.
 Pentanetricarboxylic acid.
 Pentenoic acid.
cyclo-Pentylacetic acid.
cyclo-Pentylmalonic acid.
 Phenacylsuccinic acid.
 Phenacylsulphamidobenzoic acid.
 Phenaceturic acid.
iso-Phenethylmandelic acid.
 Phenetidylcrotonic acid.
 Phenoxazonecarboxylic acid.
 Phenoxybenzoic acid.
 α -Phenoxybutyric acid.
 γ -Phenoxybutyric acid.
 γ -Phenoxyethylmalonic acid.
 γ -Phenoxyethyl- α -methylacetic acid.
 γ -Phenoxyethyl- α -methylmalonic acid.
 Phenoxyethyl-*iso*-propylglutaric acid.
 Phenoxyethyl-*iso*-propylpropanetricarboxylic acid.
 Phenylacetic acid.
 ψ -Phenylacetic acid.
 Phenylaminocinnamic acid.
 Phenyl- β -aminocrotonic acid.
 α -Phenylamino- β -phenylpropionic acid.
 Phenylazocarboxylic acid.
 Phenylbenzoic acids.
 1 : 3 : 5-Phenylbenzylpyrazolone-4-carboxylic acid.
 Phenylbromacetic acid.
 Phenylbromomalonic acid.
 Phenylbutyric acid.
 Phenylchloracetic acid.
 Phenylcinnamic acid.
 Phenyldiazosulphonic acids.
 Phenyldihydrofurfurantricarboxylic acid.
 Phenylenacetic-propionic acid.
 Phenylethanetricarboxylic acid.
 Phenylformylacetic acid.
 Phenylglycollic acid.
 β -Phenylhydracrylic acid.
 Phenylhydrazinedisulphonic acid.
 Phenylhydrazinoformic acid.
 β -Phenylhydrazinopropionic acid.
 Phenylhydrazonemethanedisulphonic acid.
 Phenylhydroxylaminoacetic acid.
 Phenylimino- β -butyric acid.
 Phenylmalonic acid.
 $\beta\beta$ -Phenylmethylhydrazinebenzylmalonic acid.
 Phenylmethylhydrazinesulphamic acid.

Acids. See :—

Phenylmethylketotetrahydropyrid-
azinecarboxylic acid.
1 : 3 : 5-Phenylmethylpyrazolone-4-
carboxylic acid.
Phenylmethylureidoacetic acid.
Phenylpropionic acid.
Phenylisopropylacetic acid.
1 : 1'-Phenylpropyltetrahydroazin-
donecarboxylic acid.
bis-Phenylpyrazolonecarboxylic acid.
Phenylselenious acid.
Phenylsemicarbazidecarboxylic acid.
Phenyltartronic acid.
Phenylthiocarbazinic acid.
Phenyl-*p*-toluic acid.
Phenyltoluidoacetic acid.
Phenyl-*p*-tolylketonesulphonic acid.
Phenylureidobenzenesulphonic acid.
Phenylureidocinnamic acid.
Phenylureidophenylpropionic acid.
Phenyl-*m*-xylylketonesulphonic acid,
m-nitro-.
Phosphorearnic acid.
Phthalaldehyde- α -naphthylamic acid.
Phthalaldehyde- β -naphthylamic acid.
Phthalaldehyde-*p*-toluidinic acid.
Phthalaldehydic acid.
Phthalanilic acid.
Phthalic acid.
iso-Phthalic acid.
iso-Phthalylhydrazinoacetoacetic acid.
Phyllocyanic acid.
Phyllopurpuric acid.
Pinic acid.
Pinonic acid.
 α -Pinonic acid.
Pinononic acid.
Pinoylformic acid.
Pipicolinic acid.
Piperazine-1 : 4-dicarboxylic acid.
 β -Piperidobenzylmalonic acid.
Piperylenedicarboxylic acid.
Polystichic acid.
Prehnitic acid.
Propanhexacarboxylic acid.
Propanetetracarboxylic acid.
Propanetricarboxylic acid.
Propargylpentacarboxylic acid.
Propiolic acid.
Propionic acid.
Propionylglycollic acid.
Propionylmalic acid.
Propionylmandelic acid.
iso-Propylacetic acid.
Propylallylacetic acid.
iso-Propylallylmalonic acid.
iso-Propylbenzoylpropionic acid.
d-iso-Propyl- β -isobutylacrylic acid.
a-iso-Propylcarboxyglutaric acid.
iso-Propylethanetricarboxylic acid.

Acids. See :—

iso-Propylglutaric acid.
iso-Propylglutolactonic acid.
iso-Propylheptanonoic acid.
Propylideneacetic acid.
Propylideneanthranilic acid.
Propylmalonic acid.
iso-Propylmalonic acid.
Propylmesitylenesulphonic acid.
iso-Propylmethylbenzoylpropionic
acid.
 α -*iso*-Propylpropane-*aaa*¹-tricarb-
oxylic acid.
iso-Propylsuccinic acid.
Proteic acid.
Proteic acid.
Protocatechuic acid.
Psoromic acid.
Pulegenic acid.
Pulegonedinitrosylic acid.
5-Pyrazolone-3-carboxylic acid.
Pyridine-3-sulphonic acid.
Pyrocinchonic acid.
Pyrolevulinic acid.
Pyruvic acid.
Quininic acid.
2'-Quinolylacetic acid.
2'-Quinolylacrylic acid.
2'-Quinolylglyceric acid.
2'-Quinolylpropionic acid.
Quinonedimalonic acid.
Racemic acid.
Rapic acid.
Rhamnohexonic acid.
Rhammonic acid.
iso-Rhammonic acid.
Rhodinic acid.
Ricininic acid.
Saccharic acid.
Saccharinic acid.
Salicylic acid.
Sandaracolic acid.
Santalonic acid.
Santoniac acid.
meta-Santoniac acid.
l-Santonous acid.
d-Santonous acid.
l-Santonous acid.
Santonous acid, racemic.
iso-Santonous acid.
Scamminolic acid.
Scammonic acid.
Sebacic acid.
Selenodiacetic acid.
Sodiodesmotroposantonous acid.
l-Sodiosantonous acid.
Sorbic acid.
Stearic acid.
Stearolic acid.
Stearoxylic acid.
Stereocaulic acid.

Acids. See:—

Stilbenedisulphonic acid.
 Suberic acid.
 Succinamic acid.
 Succinic acid.
 Succinuric acid.
 Succinylhydroxamic acid.
m-Sulphamidobenzoic acid.
iso-p-Sulphamidobenzoic acid.
 Sulphaminebenzoic acid.
p-Sulphanilic acid.
 Sulphanilidobenzoic acid.
 Sulphobenzoic acid.
m-Sulphochlorobenzoic acid.
 Sulphohydrazimethylsuccarboxylic acid.
 Sulphohydrazimethylenedisulphonic acid.
 Sulphonaphthalenedicarboxylic acid.
 Sulphonaphthylphosphinic acid.
 $\alpha\beta$ -Sulphonedipropionic acid.
 β -Sulphonedipropionic acid.
o-Sulpho-*p*-toluic acid.
 Tannic acid.
 Tariric acid.
 Tartaric acid.
meso-Tartaric acid.
 Taurocholic acid.
 Terebic acid.
 Terephthalic acid.
 Terephthalylazoimic acid.
 Terephthalylhydrazidacetoacetic acid.
 Terephthalylhydrazimic acid.
 Terpenylic acid.
 Tetracetylsuccinylhydroxamic acid.
 Tetrahydrocarvonebisnitrosylic acid.
 Tetrahydrocuminic acid.
 Tetrahydronaphthalene-1 : 4'-dicarboxylic acid.
 Tetrahydro- β -naphthylloxamic acid.
 Tetrahydrophthalic acid.
 Tetrahydroxydecoic acid.
 2 : 4 : 2' : 4'-Tetrahydroxydiphenylacetic acid.
 Tetrahydro-*p*-xylic acid.
 Tetramethylacetonedicarboxylic acid.
 Tetramethylbenzoic acids.
 Tetramethylbenzoylpropionic acid.
 Tetramethylene-1 : 3-dioxalylic acid.
 Tetramethylsuccinic acid.
 Tetrollic acid.
 Tetronic acid.
 β -Thiophenecarboxylic acid.
 Thiorufic acid.
 Thymic acid.
 Thymotic acid.
p-Toluenediazoamidobenzenesulphonic acid.
p-Toluenesulphinic acid.
o-, *m*-, and *p*-Toluic acids.
 Toluidosulphobenzoic acid.
o-, *p*-, and *m*-Toluric acids.

Acids. See:—

ψ -Tolylacetic acid.
p-Tolylglyoxylic acid.
 Tolylsulphamic acid.
 Triazoacetic acid.
 1 : 2 : 3-Triazoledicarboxylic acid.
 Tricarballylic acid.
 Trimethoxycoumarincarboxylic acid.
 Trimellithic acid.
 Trimethylacrylic acid.
 Trimethylapionolic acid.
 Trimethylbenzoic acids.
 Trimethylbenzoylpropionic acid.
 Trimethylcyanuric acid.
 Trimethylglutaric acid.
 2 : 4 : 6-Trimethylmandelic acid.
 2 : 2 : 4-Trimethylpentan-3-ollic acid.
 Trimethylpimelic acid.
 Trimethylpropionic acid.
 Trimethylpyruvic acid.
 Tropic acid.
 Tropinic acids.
 Turpethic acid.
 Undecolic acid (hendecinoic acid).
 Undecylenic acid (hendecoic acid).
 Undecylinenoic acid (hendecenoic acid).
 Uramidobenzoic acids.
 Uramidodibenzoic acids.
 Urethaneacetic acid.
 Uric acid.
 ψ -Uric acid, β -thio-.
 Usnic acid.
 Valeric acids.
iso-Valerophenone-*o*-carboxylic acid.
 Valeroylmandelic acid.
 Vanillic acid.
 Vanillinacetic acid.
 Veratroylcarboxylic acid.
 Veratroylglyoxylic acid.
 Vinylpyridinecarboxylic acid.
 Xylenesulphonic acid.
p-Xylic acid.
 Xylonic acid.
 Xylosotrihydroxyglutaric acid.
m-Xylylcarboxylic acid.
 Xylylene-*exo*-diphthalamic acid.
m-Xylylglyoxylic acid.
 Acmite from Greenland (USSING), A., ii, 372.
Acokanthera schimperi, glucoside from (FRASER and TILLIE), A., i, 386.
 Aconine, acetyl and benzoyl derivatives of (DUNSTAN and CARR), P., 1895, 178.
 ψ -Aconine (FREUND and NIEDERHOFHEIM), A., i, 451.
 Aconitic acid, occurrence of, in *Aconitum heterophyllum* (JOWETT), T., 1521; P., 1896, 158.

- Aconitic acid, preparation from *Adonis vernalis* (ORLOFF), A., i, 136.
- Aconitine, formula of (FREUND), A., i, 192.
- action of methylic alcohol on (DUNSTAN, TICKLE, and JACKSON), P., 1896, 159.
- estimation of (UMNEY), A., ii, 283.
- estimation of nitrogen in, by the absolute method (DUNSTAN and CARR), P., 1896, 48.
- ψ-Aconitine and its salts and hydrolysis (FREUND and NIEDERHOFHEIM), A., i, 451.
- Aconitum heterophyllum*, atisine, the alkaloid of, and aconitic acid in (JOWETT), T., 1518; P., 1896, 158.
- Acetaldehyde, preparation of (HOFMANN LECTURE), T., 697.
- Acridine, formation of (PICTET and HUBERT), A., i, 503.
- behaviour in sunlight (ORNDORFF and CAMERON), A., i, 176.
- Acrylhydrazone, conversion into pyrazoline (CURTIUS), A., i, 339.
- Acrylic acid, preparation of (HOFMANN LECTURE), T., 697.
- action of hydrazine on (CURTIUS), A., i, 339.
- Actinolite from Ontario (HOFFMANN), A., ii, 257.
- Address, congratulatory, to the Institute of France, P., 1895, 167; reply thereto, P., 1895, 199.
- to Lord Kelvin, P., 1896, 121.
- to Professor Stannizzaro, P., 1896, 120.
- of condolence on the death of Louis Pasteur, P., 1895, 197.
- presidential, of A. W. Vernon Harcourt, T., 563; P., 80.
- Adenine, isolation of, from tea extract (KRÜGER), A., i, 450.
- compound of, with theobromine in tea (KRÜGER), A., i, 450.
- Adipic acid from methyltropinic acid (WILLSTÄTTER), A., i, 267.
- crystallography of (CIAMICIAN and SILBER), A., i, 397.
- Adipinketone, condensation of, with benzaldehyde (VORLÄNDER and HOBOM), A., i, 603.
- Adonitol, compound of, with acetone (SPEIER), A., i, 77.
- Ægyrite, artificial (BÄCKSTRÖM), A., ii, 115.
- Æschynite from Norway (ERDMANN), A., ii, 570.
- Afzelia Cuanzensis*, the yellow dye of (KRISTELLI), A., ii, 208.
- Affinity constant. See Electrolytic conductivity.
- Agaricaceæ*, amount of tannin in (NAUMANN), A., ii, 538.
- Agaricus muscarius*, amanitin, the red pigment of (GRIFFITHS), A., i, 653.
- Air. See Atmospheric air.
- Air-bladder of fishes, presence of argon in (SCHLOESING and RICHARD), A., ii, 436.
- Air-pump, automatic mercury (KRAFFT and DYES), A., ii, 89.
- modification of von Babo's water-mercury (PRECHT), A., ii, 415.
- new form of mercury (WOOD), A., ii, 516.
- Ajuga reptans*, dyes of (WEIGERT), A., i, 388.
- α-Alanine (α-aminopropionic acid, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- Albite from Burma (BAUER), A., ii, 311.
- from Crete (VIOLA), A., ii, 433.
- from France (FOUQUÉ), A., ii, 532.
- from Maryland (HILLEBRAND), A., ii, 40.
- from Russia (GLINKA), A., ii, 567.
- Albumin, presence of an, in diastase (OSBORNE), A., i, 399.
- decomposition products of (HEDIN), A., i, 659.
- conversion of, into peptones (SCHRÖTTER), A., i, 112.
- relation of, to peptones and albumoses (SCHRÖTTER), A., i, 515.
- influence of, on initial rate of osmosis (LAZARUS-BARLOW), A., ii, 196.
- absorption of, in the small intestine (FRIEDLÄNDER), A., ii, 536.
- detection of, in urine (JOLLES), A., ii, 344.
- estimation of, in milk (VAN SLYKE), A., ii, 132.
- estimation of, in beer wort (SCHJERNING), A., ii, 631.
- Albumin, active, connection of proteosomes with (LOEW), A., ii, 59.
- Albumin, egg-, demonstration of presence of amido-groups in (CURTIUS), A., i, 337.
- reaction of and constitution of (SCHIFF), A., i, 632.
- new proteid from (BLUM), A., i, 659.
- Albumin, serum-, presence of, in normal urine (MÖRNER), A., ii, 120.
- as a nutrient for the frog's heart (WHITE), A., ii, 437.
- Albumin, vegetable-, constitution of (FLEURENT), A., i, 112.
- decomposition of, in *Lupinus luteus* (ZIEGENBEIN), A., ii, 265.
- occurrence of, in plants in spring and autumn (DAIKUHARA), A., ii, 55.

- Albuminates, estimation of, in cheese (STUTZER), A., ii, 684.
- Albumose, presence of, in urine during fever (KREHL and MATTHES), A., ii, 667.
- estimation of, in cheese (STUTZER), A., ii, 684.
- Albumoses, acetyl derivatives of (SCHRÖTTER), A., i, 515.
- absorption of, from the small intestine (FRIEDLÄNDER), A., ii, 536.
- precipitation of, by zinc sulphate (BÖMER), A., ii, 83.
- tests for (SCHRÖTTER), A., i, 112.
- Alcaptonuria, presence of homogentisic acid in (LIKHATSCHEFF), A., ii, 492.
- Alcohol. See Ethylic alcohol.
- Alcohol, $C_9H_{16}O$, from reduction of camphorone (KERP), A., i, 448.
- $C_9H_{18}O$, from reduction of *iso*-phorone (KERP), A., i, 447.
- $C_{10}H_{18}O$, from reduction of ketone, $C_{10}H_{16}O$ (WALLACH), A., i, 102.
- $C_{10}H_{20}O$, product of hydrolysing wool fat (DARMSTAEDTER and LIFSCHÜTZ), A., i, 198.
- $C_{10}H_{20}O_2$, from oil of valerian (OLIVIERO), A., i, 492.
- $C_{10}H_{20}O_4$, from oxidation of $\Delta^{8(9)}$ -menthene-1:2-diol (GINZBERG), A., i, 447.
- $C_{11}H_{22}O$, product of hydrolysing wool fat (DARMSTAEDTER and LIFSCHÜTZ), A., i, 198.
- $C_{56}H_{96}O$, in oil from Opoponax (BAUR), A., i, 57.
- secondary, $C_8H_{15}OH$, derived from dihydro-*cis*-campholytamide (NOYES), A., i, 696.
- Alcoholic hydrates, probable non-existence of (BARENDRECHT), A., i, 661.
- Alcohol-radicles, nature of (HOFMANN LECTURE), T., 696.
- haloids of, use of, as agents of substitution (HOFMANN LECTURE), T., 659.
- Alcohols, colour of, compared with that of water (SPRING), A., i, 644.
- poisonous effect of, on algæ and infusoria (BOKORNY, A., ii, 669.
- Alcohols of the terpene series, purification of (TIEMANN and KRÜGER), A., i, 382.
- extraction of, from essential oils (HALLER), A., i, 490.
- Alcohols, nitro-, formation of, by the action of formaldehyde on nitro-paraffins (HENRY), A., i, 4.
- Alcohols, polyhydric, compounds of, with formaldehyde (SCHULZ and TOLLENS), A., i, 115.
- Alcohols, action of acetone on (SPEIER), A., i, 77.
- Alcohols. See also:—
- Acenaphthyleneglycol.
- n*-Acetobutylie alcohol.
- Amylic alcohol.
- iso*-Amylic alcohol.
- Anilinomethylbutylcarbinol.
- Anisie alcohol.
- Benzhydrol.
- Benzylie alcohol.
- Bidiphenylene-ethyleneglycol.
- Borneol.
- iso*-Butylallylearbinol.
- iso*-Butylie alcohol.
- Cardol.
- Catechol.
- Cholesterol.
- Cinnamic alcohol.
- Citronellol.
- Crotonylie alcohol.
- Cuminic alcohol.
- Diallylethylie alcohol.
- Diallylisopropylie alcohol.
- Dihydroxybutane, tertiary.
- Dimethylethylcarbinol.
- 2:5-Dimethylhexan-3-olone-4.
- Dimethylpropylcarbinol.
- Dimethylisopropylcarbinol.
- Diphenyltetramethyleneglycol.
- Dipropylisopropylie alcohol.
- Erythritol.
- Ethylie alcohol.
- Geraniol (lemonol).
- Glycerol.
- Hexylallylearbinol.
- Homalinalol.
- Hydrobenzoïn.
- iso*-Hydrobenzoïn.
- Ketone alcohol, $C_{10}H_{18}O_2$, from menthene.
- Koprosterol.
- Lanolinic alcohol.
- Licareol.
- Licarhodol.
- Linalol.
- $\Delta^{8(9)}$ -Menthene-1:2-diol.
- Mentheneglycol.
- Methylallylhexenylcarbinol.
- Methyl-*iso*-butylcarbinol.
- Methylie alcohol.
- Methylsalicylic alcohol.
- β -Methyltetramethyleneglycol.
- Nonylic alcohol.
- Octylie alcohol.
- Pentaglycol.
- Phenylhydroxybenzylcarbinol.
- Pinacone.
- Pinacone, $C_{18}H_{34}O_2$, from reduction of *iso*-pharone.
- Pinacone, $C_{18}H_{30}O_2$, from reduction of camphorone.

Alcohols. See :—

- Pinolglycol.
- Phloroglucinol.
- Propylic alcohols.
- Pulegol.
- Quercitol.
- 2'-Quinolylpropylic alcohol.
- Rhodinol.
- Sobreritritol.
- Sobrerol.
- Tetrahydrocarveol.
- Trihydroxymenthane.
- Trimethylenic glycol.
- 2 : 2 : 4-Trimethylpentane-1 : 3-diol.
- Triphenylcarbinol.
- Triphenylvinyl alcohol.
- Vinylcyclopropaneglycol.
- Aldehyde. See Acetaldehyde.
- Aldehyde, $C_{13}H_{14}O$, formed by condensation of cinnamaldehyde with methyl ethyl ketone (SCHOLTZ), A., i, 368.
- Aldehyde-ammonia, action of nascent hydrogen on (JEAN), A., i, 77, 78.
- reduction of (TRILLAT), A., i, 407.
- Aldehyde-green (MILLER and PLÖCHL), A., i, 217.
- composition of (HOFMANN LECTURE), T., 623.

Aldehydes, action of zinc and ethylic bromisobutyrate on (REFORMATSKY), A., i, 128.

behaviour of, with hydrocotarnine (LIEBERMANN), A., i, 711.

poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

Aldehydes, aliphatic, action of nitric acid on (PONZIO), A., i, 461.

Aldehydes of lemon-grass oil (BARBIER and BOUVEAULT), A., i, 311, 345.

Aldehydes. See also :—

- Acetaldehyde.
- para*-Acetaldehyde.
- Acraldehyde (Acrolein).
- Apiolaldehyde.
- Anisaldehyde.
- Benzaldehyde.
- Benzoyloxybenzaldehyde.
- Benzoylvanillin.
- iso*-Butylaldehyde.
- Cinnamaldehyde.
- Citronellaldehyde.
- Crotonaldehyde.
- Cuminaldehyde.
- $\Delta^{4,6}$ -Dihydrobenzaldehyde.
- 2 : 4-Dimethoxybenzaldehyde.
- Dimethylbenzaldehyde.
- Dimethylgentisaldehyde.
- Formaldehyde.
- para*-Formaldehyde.

Aldehydes. See :—

- Formylphenylacetic acid.
- Furfuraldehyde.
- Geranaldehyde.
- Hydroxy- δ -methylfurfuraldehyde.
- Licarhodalddehyde.
- Methylethylacetaldehyde.
- δ -Methylfurfuraldehyde.
- Methylpropylbenzaldehyde.
- Methylsalicylaldehyde.
- Norpic acid aldehyde.
- Protocatechuic aldehyde.
- Rhodinaldehyde.
- Salicylaldehyde.
- Santalal.
- Trianisaldehyde.
- Tribenzaldehyde.
- Tribenzoylvanillin.
- Tribenzoyloxybenzaldehyde.
- Tricumaldehyde.
- Tridimethylgentistic aldehyde.
- Trigentistic aldehyde.
- Trimethylbenzaldehyde.
- 2 : 2 : 4-Trimethylpentan-3-olal-1.
- Trimethylvanillin.
- Tripiperonal.
- Tritolualdehyde.
- Trivanillin.
- iso*-Valeraldehyde.
- Vanillinacetic acid.
- Veratraldehyde.
- Aldehydoaldol benzoate (FREER), A., i, 590.
- Aldehydocitrazinic acid, its oxime and phenylhydrazine derivative (SELL), T., 1449 ; P., 1896, 168.
- Aldol benzoate (FREER), A., i, 590.
- Aldolanilide, action of ammonium sulphide on (v. MILLER and PLÖCHL), A., i, 216.
- Algæ, mineral food of (MOLISCH), A., ii, 207.
- effect of chlorides, bromides, and fluorides on (WYPLEL), A., ii, 266.
- poisonous action of various chemical substances on (BOKORNY), A., ii, 669.
- Alimentary canal, wandering cells of the (HARDY and WESBROOK), A., ii, 42.
- Alizarin, formation of, from anthracene (HOFMANN LECTURE), T., 627.
- hydroxylation of (WACKER), A., i, 694.
- brom-, formation of (HOFMANN LECTURE), T., 633.
- β -nitro-, preparation of (HOFMANN LECTURE), T., 633.
- Alizarin-yellows, A and C, non-formation of acid compounds of (PERKIN), T., 1440 ; P., 1896, 167.

Alkachlorophyll. See Chlorophyll.
 Alkalinity, estimation of, in cyanide solutions (BETTEL), A., ii, 276.
 Alkaloid, C_8H_3NO , from *Lupinus albus* (SOLDANI), A., i, 193.
 Alkaloids, constitution of (HOFMANN LECTURE), T., 650, 651.
 preparation of, from plant extracts (KIPPENBERGER), A., ii, 681.
 acid solutions of, action of light on (RICHARDSON and FORTEY), T., 1349.
 effect of, on germination of seeds (Mosso), A., ii, 326.
 poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.
 Alkaloids from *Anhalonium* (EWELL), A., i, 710.
 Berberis aquifolium (POMMEREHNE), A., i, 67.
 Cusparia trifoliata and *Galipea officinalis* (BECKURTS), A., i, 66.
 ipecaeuana (CRIPPS), A., i, 395.
 estimation of (CRIPPS), A., ii, 284.
 black Siberian lupins, amount of (SCHULZE), A., ii, 211.
 opoponax (BAUR), A., i, 58.
 Sophora angustifolia (PLUGGE), A., i, 68.
 Alkaloids, detection of (FORMÁRIEK), A., ii, 401.
 titration of, with iodine (KIPPENBERGER), A., ii, 282, 682.
 quantitative separation of (KIPPENBERGER), A., ii, 681.
 Alkaloids, vegetable, estimation of (KEBLER), A., ii, 551.
 Alkaloids. See also :—
 Aconine.
 ψ -Aconine.
 Aconitine.
 ψ -Aconitine.
 Adenine.
 Anagyrine.
 Anhalonine.
 Anhalonidine.
 Apopilocarpine.
 Aristolochine.
 Asparagine.
 Atisine.
 Atropine.
 Atroscine.
 Baptitoxine.
 Bebirine.
 Benzoylpellotine.
 Berbanine.
 Berberine.
 Brucine.
 Caffeine.
 Canadine.
 Cephaeline.

Alkaloids. See :—
 Chelerythrine.
 Chelilysine.
 Cinchona alkaloids.
 Cinchonidine.
 α -Cocæthyline.
 Cocaine.
 α -Cocaine.
 Conhydrine.
 Coniine.
 Conyrrine.
 Creatinine.
 Cuskhygrine.
 Cusparine.
 Cytisine.
 Deoxycinchonidine.
 Deoxycinchonine.
 Deoxyconchinine.
 Deoxyquinine.
 Dihydrogranatone.
 α -Ecgonine.
 Emetine.
 Eserine (physostigmine).
 Gelseminine.
 Granatanine.
 Granatenine.
 Granatoline.
 Granatonine.
 Harmaline.
 Harmine.
 Homocinchonidine.
 Hydrastinine.
 Hydrocotarnine.
 Hyoscine.
 Lophophorine.
 Matrine.
 Meroquinene.
 Mezealine.
 Methylscopoline.
 Morphine.
 Narcotine.
 iso-Narcotine.
 Nicotine.
 Norsparteïne.
 Oxyacanthine.
 Oxygranatine.
 Papaverine.
 Paucine.
 Pellotine.
 Picro- ψ -aconitine.
 Pilocarpine.
 Piperidine.
 Piperine.
 Quinine.
 Scopolamine.
 Scopoligenine.
 Scopoline.
 Sparteine.
 Strychnine.
 Tetrahydrocinchonidine.
 Tetrahydroquinidine.

Alkaloids. See:—

Tetrahydroquinine.

Theobromine.

Tropeines.

↓-Tropigenine.

↓-Tropine.

Tropylscopoleine.

Xanthines.

Alkyl groups attached to nitrogen, estimation of (HERZIG and MEYER), A., i, 68.

Alkylacetoacetic acids, sodio-, comparative ease of the action of ethylic salts of α -bromo-fatty acids on the ethylic salts of (BISCHOFF), A., i, 464.

Alkylmalonic acids, sodio-, comparative ease of the action of ethylic salts of α -bromo-fatty acids on the ethylic salts of (BISCHOFF), A., i, 464.

Allium cepa, occurrence of quercetin in outer skins of bulb of (PERKIN and HUMMEL), T., 1295; P., 1896, 144.

Allo-. See under parent substance.

Alloisomerism (MICHAEL), A., i, 130, 682; (MICHAEL and TISSOT), A., i, 132.

laws of (MICHAEL), A., i, 133, 134; (LIEBERMANN), A., i, 347.

Allophanic acid, benzoyl derivative of (VON PECHMANN and VANINO), A., i, 33.

ethylic salt (SCHIFF), A., i, 530; (OSTROGOVITCH), A., i, 530.

thio-, ethylic salt, probable non-existence of (DORAN), T., 339, 344; P., 1896, 75.

Alloxan, physiological action of (LUSINI), A., ii, 492.

Alloxantin from decomposition of convicin (RITTHAUSEN), A., i, 668.

water of crystallisation of (RITTHAUSEN), A., i, 416.

physiological action of (LUSINI), A., ii, 492.

detection of (RITTHAUSEN), A., i, 416.

Alloxuric bases, proportions of, in urine during nephritis (ZÜLZER), A., ii, 667.

amounts of, in urine during disease (BAGINSKY and SOMMERFELD), A., ii, 491.

separation of uric acid from (KRÜGER), A., ii, 281.

Alloys, use of aluminium in preparing (MOISSAN), A., ii, 601.

thermo-electromotive force of (DEWAR and FLEMING), A., ii, 4.

behaviour of, on solidification (GAUTIER), A., ii, 602.

Allylacetic acid, action of sodium hydroxide on (SPENZER), A., i, 128.

Allylacetoacetic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.

1-Allyl-5-allylimido-2-dithiourazole, (FREUND and HEILBRUN), A., i, 416.

Allylbenzene, magnetic rotatory power, &c., of (PERKIN), T., 1084, 1126, 1143, 1149, 1224, 1246.

n-Allylbutylene- ψ -thiocarbamide and its picrate (LUCHMANN), A., i, 546.

Allyl-*p*-dinitrodiazoamidobenzene (MELDOLA and STREATFIELD), P., 1896, 51.

Allyldithiourazole (FREUND and HEILBRUN), A., i, 415.

action of hydrogen peroxide on (FREUND and HEILBRUN), A., i, 415, 416.

Allylene (*methylacetylene*, *propinene*), preparation of (KEISER), A., i, 457.

$\alpha\gamma$ -dibromo- (LESPIEAU), A., i, 332.

1 : 2 : 3-tribromo-, action of potash on (LESPIEAU), A., i, 332.

Allylic alcohol, preparation and properties of (HOFMANN LECTURE), T., 697.

bromide, preparation of (HOFMANN LECTURE), T., 697.

chloride, preparation of (HOFMANN LECTURE), T., 697.

iodide, preparation of (HOFMANN LECTURE), T., 697.

sulphide, preparation of (HOFMANN LECTURE), T., 697.

Allylmalonic acid, action of sodium hydroxide on (SPENZER), A., i, 127, 128.

ethylic salt, rate of formation of (BISCHOFF), A., i, 85.

hydrolysis of (HJELT), A., i, 205.

action of ethylenic bromide on (BISCHOFF), A., i, 129.

Allylmalonic acid, sodio-, ethylic salt, action of ethylic α -bromobutyrate, α -bromoisobutyrate, α -bromopropionate, and α -bromisovalerate on (BISCHOFF), A., i, 467.

Allylpropanetricarboxylic acid, ethylic salt, velocity of hydrolysis (HJELT), A., i, 600.

Allylsuccinimide, velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.

Allylthiocarbamide, action of solution of mercuric iodide in potassium iodide on (FOERSTER), A., i, 414.

halogen derivatives, action of reducing and oxidising agents on (GADAMER), A., i, 415.

dibromide and its salts (GADAMER), A., i, 414.

- Allylthiocarbamide, action of methylic iodide on (GADAMER), A., i, 415.
 bromochloride (GADAMER), A., i, 414.
 dichloride and salts (GADAMER), A., i, 415.
 chloriodide and salts (GADAMER), A., i, 414.
 diiodide and salts (GADAMER), A., i, 414.
 compounds of, with inorganic salts (GADAMER), A., i, 140.
 compounds of, with silver nitrate, action of picric acid on (GADAMER), A., i, 140.
 combination of, with trimethylamine (GADAMER), A., i, 141.
 Allylthiocarbamide, bromo-, formula of (GADAMER), A., i, 415.
 Allylthiocarbimide, synthesis of (HOFMANN LECTURE), T., 697.
 action of bromine on (DIXON), T., 17.
 action of iodine and iodine monobromide on (DIXON), T., 26.
 Allylthiocarbimide, α -chlor- and α -brom-, action of ammonia on (DIXON), T., 25.
 Allylthiourea, action of bromine on (DIXON), T., 18, 19; P., 1895, 215.
 action of iodine on (DIXON), T., 25; P., 1895, 216.
 Allyltoluidine, preparation of (HOFMANN LECTURE), T., 604.
 Almandine from Sydney, N.S.W. (SMITH), A., ii, 38.
 Almond, proteids of the (OSBORNE and CAMPBELL), A., i, 715.
 Aloes, detection of, in mixtures (KREMEL), A., ii, 401.
 Alein, detection of (FORMÁNEK), A., ii, 401.
 Aiphol. See Salicylic acid, α -naphthyllic salt of.
 Alum. influence of pressure on the solubility in water of (VON STACKELBERG), A., ii, 638.
 effect of, in wine (SESTINI), A., ii, 342.
 estimation of, in wines (GEORGES), A., ii, 451.
 Aluminium, electrolytic deposition of (WARREN), A., ii, 423.
 solution and diffusion in mercury of (HUMPHREYS), T., 1679; P., 1896, 220.
 action of dilute ammonia on (GÖTTIG), A., ii, 524.
 action of mercury salts on (RICHARDS), A., ii, 650.
 action of oxalic acid on (ROSENHEIM), A., i, 278, 343.
 Aluminium, action on solutions of salts (KIPPENBERGER), A., ii, 522.
 action of water and other liquids on (DONATH), A., ii, 563.
 presence of sodium in (MOISSAN), A., ii, 301.
 Aluminium-alloys, preparation of (MOISSAN), A., ii, 602; (COMBES), A., ii, 603.
 action of water on (MOISSAN), A., ii, 301.
 with nickel, manganese, and chromium (COMBES), A., ii, 604.
 with tin, silver, and antimony (GAUTIER), A., ii, 602.
 with vanadium (MOISSAN), A., ii, 609.
 analysis of (MOISSAN), A., ii, 338.
 Aluminium chloride, compounds of, with ammonia (STILLMAN and YODER), A., ii, 301.
 hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
 oxide (*alumina*) in glass (APPERT), A., ii, 423.
 influence of, on the reversion of superphosphate (SMETHAM), A., ii, 364.
 potassium phosphates from Alg-ria (CARNOT), A., ii, 34.
 phosphates from Algeria and France (CARNOT), A., ii, 529.
 thiopyrophosphate (FERRAND), A., ii, 473.
 thiophosphite (FERRAND), A., ii, 418.
 sodium silicate, an artificial (FRIEDEL), A., ii, 482.
 ferrous sulphate, occurrence of, on bricks exposed to sulphurous anhydride (PATERSON), T., 66; P., 1895, 203.
 sulphide, effect of high temperature on (MOURLOT), A., ii, 603.
 telluride (WHITEHEAD), A., ii, 164.
 Aluminium, analysis of (MOISSAN), A., ii, 338.
 estimation of, by alkalis volumetrically (RUOSS), A., ii, 500.
 estimation of iron, carbon, silicon, and sodium in (MOISSAN), A., ii, 339.
 separation of, qualitatively, from iron, nickel, cobalt, chromium, manganese, and zinc (HARE), A., ii, 127.
 separation of chromium from (JANNASCH and VON CLOEDT), A., ii, 222.
 Amalgams, properties of metals separated from their (GUNTZ), A., ii, 421.
 Amandin, a proteid present in almond and peach kernel (OSBORNE and CAMPBELL), A., i, 715.

Amanita muscaria, amanitin, the red pigment of (GRIFFITHS), A., i, 653.
 Amanitin (GRIFFITHS), A., i, 653.
 Amaranth, red dye of (WEIGERT), A., i, 388.
 Amber from Servia (LOSANITSCH), A., ii, 252.
 Amber. See also Burmite.
 Amides, classification of (LACHMANN), A., i, 601.
 general method for preparation of (COLSON), A., i, 282.
 preparation from nitriles by hydrogen peroxide (DEINERT), A., i, 149.
 action of bromine on (HOFMANN LECTURE), T., 719.
 formation of, in plants (TREUB), A., ii, 328.
 in nodules, amount of nitrogen as (STOKLASA), A., ii, 205.
 Amides, thio-, preparation of (HOFMANN LECTURE), T., 710.
 Amides. See also:—
 Acetamide, cyano-.
 Acetamidobenzenylazoximethenyl.
 β -Acetamido- μ -methylthiazole- α -carboxylamide.
 Acetamidophenol, 2 : 4-bromonitro-.
 Acetamidothymol.
 Acetanilide.
 o -Acetanisoilamide, p -nitro-.
 Acetethylanilamide.
 Acetobenzamide.
 Acetobenzanilide.
 Acetodiphenylamide.
 Acetoguaiaecolamide, nitro-.
 Acetomethylcarbamide.
 Acetonylcarbamide.
 Aceto-xylidide.
 Acetylactylacetamide.
 Amidofornic acid, methylamides of.
 Amygdalylamidophenetoil.
 n -Allylbutylene- ψ -thiocarbamide.
 Allylthiocarbamide.
 Allylthiourea.
 Anthrapurpuramide.
 Asparagine.
 Aspartamide.
 Azinidouramidobenzoic acid.
 Azodiisobutyramide.
 Benzamide.
 Benzamidoacetamidothymol.
 Benzamidobenzoylthymol.
 p -Benzamidosulphonamide.
 Benzamidothymol.
 Benzanilide.
 Benzenesulphonamide.
 Benzene- o -sulphonamide, p -bromo-cyano-.
 Benzenesulphonanilide.
 Benzenesulphonphenylhydroxylamide.

Amides. See:—

Benzenesulphonylhydroxylamide.
 Benzenesulphotoluidide.
 Benzenylamidoxime.
 Benzethylamide.
 Benzethyleneamide.
 Benzobutylamide.
 Benzochloro-xyleneamides.
 Benzodichloranilide.
 Benzodiethylthiourea.
 Benzoformanilide.
 Benzoform- o -toluidide.
 Benzoic acid, nitromethylamides of.
 Benzomethylamide.
 Benzo- m -toluamide.
 Benzoveratrylamide.
 Benzo- m -xylylenediamide.
 Benzoylbenzamide, m -nitro-.
 Benzylidenedicarbamide.
 Benzyl- o -sulphamidobenzoic acid.
 Butyramide.
ab-iso-Butyro- α -naphthylthiocarbamide.
ab-iso-Butyrophenylthiocarbamide.
ab-iso-Butyrotolylthiocarbamides.
ab-iso-Butyrotolylureas.
trans- π -Camphanic acid.
 Camphenesulphonamides, chloro-.
 Camphoramie acid.
 Camphoronimamide.
 Carbamide.
 Carbonyldicarbamide.
 Cinchomeramide.
 Crotonamide.
iso-Crotonamide.
 Cymenensulphonamide.
 Diacetamidothymol.
 Diacetodimethylanilinediamide.
 m -Diacetophenylenediamide.
 Diacetyldilactamide.
 Diallylacetamide.
 Dibenamide.
iso-Dibenzamido- p -xylidene.
 Diethoxyphenylmalonamide.
 Diethoxyphenyloxamide.
 Diethylcyanacetamide.
 Dihippenylcarbamide.
 Dihydro-*cis*-campholytamide.
 Dihydrohippuroflavin.
 Dihydroxyphenylmalonamide.
 Dihydroxyphenyloxamide.
 Dimethoxyphenylmalonamide.
 Dimethoxyphenyloxamide.
 Dimethylecyanacetamide.
 Dimethylmalonamide.
 Dimethylmalonic acid, methylamides of.
 Dimethyloxamide.
 Diphenylcarbamide.
 Dipropylecyanacetamide.
 Ditolylcarbamides.
 Ethoxyphenyloxamide.

Amides. See :—

Ethylbenzamide.
 Ethyl-*iso*-formanilide.
 Ethyloxamide.
 Ethylsulphonie acid, methylamides of.
p-Ethyltoluenesulphonamide.
 Formamide.
 Formanilide.
 Formobenzanilide.
 Formobenzo-*p*-toluidide.
 Formocarbamide.
 Hemipinamic acid.
 Heptoic acid, methylamides of.
 Hexahydro-*p*-xylanilamide.
 Hydrazodicarbonamide.
 Hydrazodicarbothioallylamide.
 3-Hydroxycyclohexane-1-carboxylamide.
 Hydroxymethyldihydropyridonedicarboxylamide.
 Mandelamide.
 Malonamide.
 Methylamidoformamide.
 Methylbenzamide.
 Methylbenzylbenzamide.
 Methyl-*iso*-butylearbamide.
 Methyl- β -camphoramide.
 Methyldihydrofurfurandicarboxylamic acid, ethylie salt of.
 β -Methylethylene- ψ -thiocarbamide.
n-Methylethylene- ψ -thiourea.
 μ -Methylimidazolylphenylthiourea.
 μ -Methylimidazolyl-*o*-tolylthiourea.
 Methylpropylearbamide.
 μ -Methylthiazole- α -carboxylamide.
 1-Naphthalenesulphonamide.
 α -Naphthoylbenzamide.
 α -Naphthyl-*o*-acetamidobenzylacetamide.
 β -Naphthylazocarboxylamide.
 β -Naphthylopianamide.
 Oxamide.
n-Palmito-*v*-phenylbenzylthiourea.
 α -Palmito-*b*-phenylbenzylurea.
n-Palmito-*v*-phenylmethylthiourea.
 $\alpha\beta$ -Palmitophenylthiocarbamide.
 Palmitothiocarbamide.
 αb -Palmitotolylthiocarbamides.
 α -Phenoxybutyramide.
 α -Phenoxybutyrothiamide.
 Phenylacetamide.
 ψ -Phenylacetamide.
n-Phenylaceto-*v*-phenylbenzylthiourea.
 Phenylacetophenylthiocarbamide.
 αb -Phenylaceto-*o*-tolylthiocarbamide.
 αb -Phenylaceto-*p*-tolylthiocarbamide.
 Phenylallylthiocarbamide.
 Phenylazocarboxylamide.
 Phenylbenzylhydroxyethylamine.
n-Phenylbutylene- ψ -thiocarbamide.

Amides. See :—

p-Phenylenecarbamide.
 Phenylisocrotyl (?)-thiocarbamide.
s-Phenyl- γ -ethoxybutylthiocarbamide.
 Phenylglycollamide.
 Phenylhydrazidoacetamide.
 Phenylmethyl-*iso*amylearbamide.
 Phenylmethyl-*iso*amylthiocarbamide.
 Phenylmethylisobutylearbamide.
 Phenylmethylisobutylthiocarbamide.
 Phenylmethylpropylearbamide.
 Phenylmethylpropylthiocarbamide.
 Phenylsulphonie acid, methylamides of.
 Pierie acid, methylamides of.
 Pinaeolylthiocarbamide.
 Piperazine-1 : 4-dicarboxylamide.
 Propionamide.
n-Propiono-*v*-phenylbenzylthiourea.
n-Propiono-*v*-phenylmethylthiourea.
 αb -Propionophenylthiocarbamide.
 αb -Propionotolylthiocarbamides.
 Propylene- ψ -thiocarbamide.
 Pulegenamide.
 Pyrotartarie acid, amide of.
 Quininamide.
 2'-Quinolylacrylamide.
 2'-Quinolylpropionamide.
 Salieylamide.
 Stearamide.
 αb -Stearo- α -naphthylthiocarbamide.
 Stearo- α -naphthylurea.
n-Stearo-*v*-phenylbenzylthiourea.
 α -Stearo-*b*-phenylbenzylurea.
 αb -Stearo-*o*-tolylthiocarbamide.
 Stearo-*o*-tolylurea.
 αb -Stearo-*m*-xylylthiocarbamide.
 αb -Stearo-*m*-xylylurea.
 Succinamide.
 Succinie acid, methylamides of.
 Succinie anhydride, *o*-carboxyphenylamide of.
 Succinie anhydride, β -naphthylamide of.
 Sulphamidobenzamide.
 Sulphuric acid, methylamides of.
 Tartronamide.
 Tetramethyloxamide.
 Tetramethylsuccinamide.
 Uramidodibenzoic acids.
 Toluenesulphonamide.
 Tribenzenesulphonhydroxylamide.
 Trimethylacetic acid, methylamide of.
 Trimethylallylthiocarbamide.
 Tritoluenesulphonamide.
 Valerianilide.
 Xylenesulphonamide, chloro-.
 Amidines, discovery of (HOFMANN LECTURE), T., 704.

Amido. See Amino.

Amine $C_8H_{15}NH_2$, from dihydro-*cis*-campholytamide (NOYES), A., i, 696.

$C_9H_{11}Br_2NO$, obtained by action of ammonia on dibromo- ψ -eumenol bromide (AUWERS and HOF), A., i, 422.

$C_{10}H_{17}NH_2$, from reduction of oxime of ketone $C_{10}H_{16}O$; its hydrochloride and carbamide (WALLACH), A., i, 102.

$C_{14}H_{14}Br_2N_2O_2$, obtained in the preparation of *p*-brom-*o*-anisidine (MELDOLA, WOOLCOTT, and WRAY), T., 1329.

$C_{14}H_{23}NH_2$, from oxime of ketone $C_{14}H_{22}O$; its hydrochloride, platinochloride, nitrate (WALLACH), A., i, 572.

$C_{18}H_{23}Br_2NO_2$, derived from the dimethylaniline derivative of dibromo- ψ -eumenol bromide (AUWERS and SENTER), A., i, 424.

$C_{36}H_{27}N_5$, obtained in the oxidation of phenyl-*o*-phenylenediamine (O. FISCHER and DISCHINGER), A., i, 539.

Amines, $C_{22}H_{20}N_2O$, isomeric, formed by action of alcoholic potassium cyanide on benzylidene-*p*-toluidine (MILLER and PLÖCHL), A., i, 609.

Amines, action of bromine on (HOFMANN LECTURE), T., 720.

action of carbon bisulphide on (HOFMANN LECTURE), T., 663.

separation of (HOFMANN LECTURE), T., 662.

Amines, aromatic, action of phosphorous oxychloride on (MICHAELIS and SILBERSTEIN), A., i, 344.

Amines, fatty, action of arsenious chloride on (MICHAELIS and LUXEMBOURG), A., i, 343.

action of boron chloride on (MICHAELIS and LUXEMBOURG), A., i, 343, 344.

action of phosphorous chloride, oxychloride, and thiochloride on (MICHAELIS and LUXEMBOURG), A., i, 343.

action of silicon chloride on (MICHAELIS and LUXEMBOURG), A., i, 343.

amines, secondary and tertiary, preparation of (HOFMANN LECTURE), T., 655.

partial oxidation of (DE HAAS), A., i, 122.

amines. See also:—

Allyltoluidine.

Amines. See:—

Amylamine.

iso-Amylamine.

Anilaminobenzenylphenylimidine.

Aniline.

o-Anisidine.

p-Anisidine.

Arabinosamine.

Azotrinaphthylidiamine.

Benzene-4-azo-2-aminophenol, *m*-nitro-.

Benzenesulphonobenzylhydroxylamine.

Benzidine.

Benzophenylethylenediamine.

Benzophenylpropylenediamine.

Benzylamine.

Benzylaminophenetoil.

Benzylaniline.

Benzylbromethylamine.

Benzyl dibromodiethylamine.

Benzyl dihydroxydiethylamine.

Benzyl dimethylamine.

Benzyl hydroxyethylamine.

Benzylideneaminophenylimido- β -butyric acid.

Benzylideneaminothymol.

Benzylideneaniline.

Benzylidene-1 : 2-naphthylenediamine.

Benzylidene-*o*-phenylenediamine.

Benzylphenylhydroxyethylamine.

Benzylvinylamine.

Bishydroxytetrahydronaphthylamine.

Butylamine.

iso-Butylamine.

Catechol, 5-nitro-3-amino-.

α -Crotylamine.

iso-Crotylamine.

ψ -Cumenol bromide, dibromo-, methylamine, ethylamine, diethylamine, β -naphthylamine, methylaniline, diethylaniline, derivatives of.

Cumylidene-*p*-aminothymol.

Decylamine.

Decylenediamine.

Dehydrothiotoluidine.

Diallylethylamine.

Diamylamine.

Dibenzylamine.

Dibenzylidenediaminopentamethylenetetramine.

Dibenzylidene-*o*-phenylenediamine.

Di-*iso*-butylamine.

Dicinnamylidenediaminopentamethylenetetramine.

Diethylamine.

Diethylaminohexahydrotoluic acid.

2 : 3-Diethylaminohydroxytetrahydronaphthalene.

Diethylaminophenonaphthoxazine.

Diethylaminophenonaphthoxazone.

Amines. See:—

m-Diethylaminophenylic salts.
exo-Diethylamino-*o*-toluic acid.
 Diethylaniline.
 Diethylenetriamine.
 Diethyldiethylenediamine.
 Diethylethylenediamine.
 Di-*o*-hydroxybenzylidenediamino-
 pentamethylenetetramine.
 Dimethylamine.
 Dimethylaminobenzenyldimethylimi-
 dine.
 Dimethylaminobenzenyl- β -naphthyl-
 imidine.
 Dimethylaminodiphenazone.
 2 : 3-Dimethylaminohydroxytetra-
 hydronaphthalene.
 Dimethylaminophenonaphthoxazine.
 Dimethylaminophenonaphthoxazone.
 Dimethylaminophenylic salts.
 Dimethylaniline.
 Dimethylnaphthylamines.
 Dimethylnitramine.
 Dimethyl-*p*-phenylenediamine.
 Dimethyltoluidines.
 Dimethyl-3 : 4-tolylenediamine.
 Di- β -naphthylamine.
 Di-*m*-nitrobenzylidenediaminopenta-
 methylenetetramine.
 Diphenylamine.
 Diphenyldiethylenediamine.
 Diphenyldisulphonedimethyl-*p*-
 phenylenediamine.
 2 : 5-Diphenyldisulphone-*p*-phenyl-
 enediamine.
 Diphenylethylenediamine.
 Diphenylformamidine.
 Diphenylsulphone-*o*-aminophenol.
 Dipropylamine.
 γ -Ethoxybutylamine.
p-Ethoxyphenyl-5-chloro-*m*-tolyl-
 amine.
p-Ethoxyphenyl-*m*-ethoxy-*p*-phenyl-
 enediamine.
p-Ethoxyphenyl-*o*-tolylamine.
p-Ethoxyphenyltolylenediamines.
 Ethoxytolylphenylenediamines.
 Ethoxytolyltolylenediamines.
 Ethylamine.
 Ethylaniline.
 Galactoseamine.
 Gnanidine.
cyclo-Heptenamine.
 Heptylamine.
 Hexadecylamine.
 Hexamethylenediamine.
 Hexamethylenetetramine.
 β -*iso*-Hexylamine.
 Hippuro-*p*-toluylenediamine.
 Hydroxydiphenylethylamine.
 Hydroxy- β -*iso*-hexylamine.
 Hydroxyethoxymethylquinoline.

Amines. See:—

Hydroxynaphthylhydroxyphenyl-
 amine.
 Hydroxyphenylamine.
 2 : 3-Hydroxytetrahydronaphthyl-
 amine.
 Maltose-amine.
 Menthylamine.
 Mesidine.
 Methylamine.
 Methyl-*iso*-amylamine.
 Methylaniline.
 Methylbenzylamine.
 Methylbutylamine.
 Methyl-*iso*-butylamine.
 Methylbutylnitramine.
 Methyl-diethenyltetraminobenzene.
 Methyl-diethylamine.
 Methyl-diphenylamine.
 β -Methylhydroxylamine.
 Methyl-nitramine.
 Methyl-noropiananilidic acid.
 Methyl-noropianeic acid tetrahydro-
 quinoline.
 Methyl-noropian- α -naphthalidic acid.
 Methyl-noropian- β -naphthalidic acid.
 Methyl-noropian-*p*-toluidic acid.
 Methylphenylaminobenzenylmethyl-
 imidine.
 Methylpropylamine.
 Methylpropylaniline.
 β -Methyltetramethylenediamine.
 Methyl-*p*-toluidine.
 $\alpha\beta$ -Naphthobenzaldehydine.
 α -Naphthylamine.
 β -Naphthylamine.
 2 : 1-Naphthylaminesulphonic acid.
 β -Naphthylaminobenzenylmethyl-
 imidine.
 α -Naphthyl-*o*-aminobenzylamine.
 β -Naphthyl-*o*-aminobenzylamine.
 α -Naphthyl-dipropylamine.
 Naphthylenediamine.
 1 : 3-Naphthylenediamine.
 β -Naphthylmethylaminobenzenyl-
 methylimidine.
 Bis-*p*-nitrodiazobenzenepentamethyl-
 enetetramine.
 Nonylamine (Ennylamine).
 Opiananthranilic acid.
 Opianeic acid, β -naphthylamine.
 Phenetidine.
 Phenol, 2 : 4 : 6-bromonitramino-.
 Phenylaminobenzenylanilimidine.
 Phenylaminobenzenylmethyylimidine.
 Phenylethylamine.
 Phenyldimethylamine.
 Phenylenediamines.
 Phenylene-ethylenediamine.
 Phenyl-6-ethoxy-1 : 3 : 4-tolylenedi-
 amine.
 Phenylethylenediamine.

Amines. See :—

Phenylglyoxyethoxybenzylamine.
 Phenylglyoxylmethoxybenzylamine.
 β -Phenylhydroxylamine.
 Phenyl ether, diamino-.
 Phenylmethylpropylamine.
 Phenyl-*o*-phenylenediamine.
 Phenyltolylamine.
 Phthalaldehydemethylaniline.
 Phthalaldehyde- α -naphthylamine acid.
 Phthalaldehyde- β -naphthylamine acid.
 Phthalaldehyde-*p*-toluidinic acid.
 Phthalaldehydic- α -naphthylamine.
 Phthalaldehydic- β -naphthylamine.
 Phthalaldehydicpiperidine.
 Phthalaldehydictetrahydro-*iso*-quinoline.
 Phthalaldehydic-*p*-toluidine.
 Piperonylaminoacetone.
 Piperonylbenzylamine.
 Propylamine.
 Pulegoneamine.
 Sorbose-amine.
 Succinylacetoxylamine.
 Tetrethylaminodiphenoxazinium chloride and iodide.
 Tetraethyldiamino- α -azonaphthalene.
 Tetrahydrocarvylamine.
 Tetrahydro- α -naphthylamine.
 Tetrahydro- β -naphthylamine.
 Tetramethylaminodiphenoxazinium chloride and iodide.
 Tetramethyldiamino- α -azonaphthalene.
 Tolidine.
 Toluidines.
 Tolyethoxy-*o*-phenylenediamines.
o-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine.
m-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine.
p-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine.
 Tolylmethylnitramine.
 Triethylchrysaniline.
 Triethyldiethylenetriamine.
 Triethylenetriamine.
 Triethyltriethylenetriamine.
 Trimethylamine.
 Trimethylehrysaniline.
 Trimethylenephenylenediamine.
 Tripropylamine.
iso-Undecylamine (*iso*-Hendecylamine).
 Veratrylamine.
 Vinylamine.
 1 : 3 : 4-Xylidine.
m-Xylylene-2 : 5-diamine.
 Xylose-amine.

Amines. See also Bases.
 Amino-acid, $C_{10}H_{19}NO_2$, from cyano-

lauronic acid, and its platinochloride (HOOGWERFF and VAN DORP), A., i, 314.

Aminoazo-compounds, velocity of change of diazoamino-compounds into (GOLDSCHMIDT and REINDERS), A., ii, 556.

Amino-compounds, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

detection of (DRAGENDORFF), A., ii, 280.

Amino-derivatives. See also :—

Acetic acid (under Glycocine).

Acetylphenimeisatin.

Azobenzene.

Azonaphthalene.

Azoxybenzene.

Benzaldehyde.

Benzaldehydophenylhydrazone.

Benzaldehydine.

Benzaldoxime.

Benzanilide.

Benzenesulphonic acid.

Benzenylamidoxime.

Benzenylazoxime-ethenyl.

Benzethylamide.

Benzethyleneamide.

Benzhydrazide.

Benzhydrol.

Benzoic acid.

Benzoindiacarboxylic acid.

Benzomethylamide.

Benzophenone.

Benzoylazoimide.

p-Benzoylbenzoic acid.

Benzoylhydrazines.

Benzylamine.

Benzylanisidine.

Benzylchloraniline.

Benzyl methylic sulphide.

Benzyl-*p*-phenetidine.

Benzyltoluidines.

Butyric acid.

Camphor.

Carbazole.

Carbostyrl.

Carboxyanidobenzoic acid.

Carvacrol.

Catechol.

Cymidine.

Dibenzyltetrazole.

Dihydroxydibenzoyldihydropyrazine,

Dihydroxynaphthalene.

Dimethylamine.

Dimethylaniline.

Dimethyltolylenediamine.

Diphenyl.

Diphenylamine.

Diphenylpropionic acid.

Durene.

Amino-derivatives. See :—

Formic acid.
 Guanidine.
 Hexahydrophenylaminoacetic acid.
cis-Hexahydro-*p*-toluic acid.
cyclo-Hexane.
 4-Hydroxybenzoic acid.
 Hydroxydiphenylamine.
 Hydroxynaphthalenesulphonic acids.
 Hydroxynaphthoic acid.
 Hydroxyphenazine.
 Hydroxyquinoline.
 Indole-2'-carboxylic acid.
 Menthol.
 Menthone.
 Methanedisulphonic acid.
p-Methoxydiphenylamine.
 Methoxyphenazine.
 3-Methoxyquinoline.
 Methylaniline, nitro-.
 Methylbenzylamine.
 Methylbenzylbenzamide.
 Methylene-phenylene-amidine.
 3-Methylindazole.
 3-Methyl-5-*iso*-propylbenzene.
 Methylthiazolecarboxylic acid.
 Naphthaquinoneoxime.
sym-Naphthazine.
 Naphthoic acid.
 Naphthol.
 Naphtholsulphonic acid.
 Naphthylbenzylhydrazine.
 Octoic acid.
 Orcinol.
 Oxalic acid.
 Pentamethylenetetramine.
 Penthiazoline.
 Phenol.
 Phenolphthalein.
 Phenoxazonecarboxylic acid.
p-Phenoxybenzoic acid.
 Phenyl *p*-tolyl ketone.
 Phenylxylyl ketones.
 Phenylazimidobenzene.
 Phenylaminoazimidobenzene.
 Phenylbenzoic acid.
 Phenylbenzylhydrazine.
 Phenylbenzylidenehydrazone.
 Phenylcinnamic acid.
 Phenylerotonic acid.
 5-Phenyl-2 : 6-dibenzyl-*m*-diazine.
 Phenyl ether.
 Phenylimido- β -butyric acid.
 Phenylinduline.
 Phenylmercaptan.
 α -Phenylpyridine.
p-Tolyl-*o*-phenylenediamine.
 Phenyltolylsulphone.
 Propionic acid (under α -Alanine).
 Quinoline.
 Tetramethyldiphenyl.

Amino-derivatives. See :—

Tetrazole.
 Thymol.
 Toluene.
 Tri-methylenetriamine.
 2 : 2 : 6-Trimethylpiperidine.
 Uracyl hydrosulphide.
 Uramidobenzoic acid.
 Xylyleneazodiamine.
 Amino-group, influence on the strength of acids of the (SAKURAI), T., 1659; P., 1896, 181.
 Ammonia in bituminous mineral waters (PARMENTIER), A., ii, 195.
 formation of, by electrolysis of nitric acid (IHLE), A., ii, 464.
 electrolytic conductivity of solutions of (KONOWALOFF), A., ii, 351.
 solubility of, in water (KONOWALOFF), A., ii, 351.
 action of iodine on (CHATTAWAY), T., 1577; P., 1896, 173.
 lecture experiment showing the combustion of oxygen in (OSSIPOFF), A., ii, 356.
 complex compounds of, with metals, constitution of (KURNAKOFF), A., ii, 170.
 compounds of, with the chlorides of iron (MILLER), A., ii, 26.
 influence of acids on excretion of (DUNLOP), A., ii, 484.
 excretion of, in disease (HALLERVORDEX), A., ii, 379; (RUMPF), A., ii, 379, 618.
 estimation of, in cyanide working solutions (BETTEL), A., ii, 277.
 estimation of, in tobacco (KISSLING), A., ii, 401; (VEDRÖDI), A., ii, 630.
 Ammoniacal nitrogen in minerals (ERDMANN), A., ii, 570.
 Ammoniacum, composition of (LUTZ), A., i, 249.
 Ammonium compounds, constitution of (HOFMANN LECTURE), T., 667.
 Ammonium salts, action of, on coagulation of milk and blood (RÜGER), A., ii, 49.
 amalgam (PROUDE and WOOD), P., 1895, 236.
 antimoniomalate (HENDERSON and BARR), T., 1452; P., 1896, 168.
 antimoniomucate (HENDERSON and BARR), T., 1453; P., 1896, 168.
 monothioarsenate (WEINLAND and RUMPF), A., ii, 473.
 bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.
 cuprous bromide (WELLS and HURLBURT), A., ii, 107.

- Ammonium carbonate, formation of, from urea in fermentation of uric acid (GÉRARD), A., ii, 668.
- chromous carbonate (BAUGÉ), A., ii, 426.
- chloride, apparatus for demonstrating the volumetric composition of (CARNEGIE and WALES), A., ii, 558.
- freezing points of dilute solutions of (LOOMIS), A., ii, 352.
- influence of pressure on the solubility in water of (VON STACKELBERG), A., ii, 638.
- action of magnesium on solutions of (VITALI), A., ii, 419.
- cuprous chlorides (WELLS and HURLBURT), A., ii, 107.
- iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
- cuprous iodide (WELLS and HURLBURT), A., ii, 107.
- molybdate, modified solution of (WINTON), A., ii, 622.
- iodomolybdate (CHRÉTIEN), A., ii, 651.
- perthiomolybdate (HOFMANN), A., ii, 476.
- nitrate, thermal expansion of solutions of (DE LANNOY), A., ii, 233.
- freezing points of dilute solutions of (LOOMIS), A., ii, 352.
- sulphide, exclusion of, from qualitative analysis (TARUGI), A., ii, 391.
- sulphate, thermal expansion of solutions of (DE LANNOY), A., ii, 233.
- phosphate, suitability of, for nitrification (MARCIILE), A., ii, 669.
- effect of, on germination (CLAUDEL and CROCHETELLE), A., ii, 442.
- commercial, estimation of water in (HUGHES), A., ii, 70.
- vanadium alum (PICCINI), A., ii, 304.
- inidosulphonates (DIVERS and HAGA), T., 1621; P., 1896, 179.
- barium inidosulphonates (DIVERS and HAGA), T., 1622.
- mercury inidosulphonate (DIVERS and HAGA), T., 1629.
- fluoroxypertitanate (PICCINI), A., ii, 178.
- sodium, and potassium paratungstates (HALLOPEAN), A., ii, 652.
- zirconodecatungstate (HALLOPEAN), A., ii, 607.
- citrate solution, estimation of neutrality in (LORD), A., ii, 623.
- Ammonium cyanide, action of formaldehyde on (CURTIUS), A., i, 337.
- thiocyanate, electrical conductivity of solutions in acetone of (LASZCZYNSKI), A., ii, 555.
- electrolysis of a solution in acetone of (LASZCZYNSKI), A., ii, 556.
- cobaltioxalate (SÖRENSON), A., i, 204, 205.
- Ammonium, estimation of, volumetrically (DE KONINCK), A., ii, 77.
- Ammonosinotannol in ammoniacum, and acetyl and benzoyl derivatives of (LUZ), A., i, 249.
- Ampelocissus*, constituents of sap of (HÉBERT), A., ii, 494.
- Amphibole. See Hornblende.
- Amphibolite from N.S.W., alteration to serpentine (JAQUET), A., ii, 534.
- Amygdalin, decomposition of, in the living body (GÉRARD), A., ii, 570.
- detection of (FORMÁNEK), A., ii, 401.
- Amygdalyl-4-amidophenetoil and its acetyl derivative (WENGHÖFFER), A., i, 360.
- Amylene (*methylethylethylene*), action of acetic chloride on (KONDAKOFF), A., i, 462.
- Amylene (*trimethylethylene*), action of acetic chloride on (KONDAKOFF), A., i, 462.
- bromo- (IPATIEFF), A., i, 401.
- Amylenic $\alpha\gamma$ -dibromide, action of sodioacetylacetone on (BARBIER and BOUVEAULT), A., i, 637, 638.
- iso*-Amylenic $\alpha\gamma$ -dibromide (IPATIEFF), A., i, 330.
- iso*-Amylenic $\beta\gamma$ -dibromide, constitution of (IPATIEFF), A., i, 401.
- Amylacetic acid, amylic salt, rotatory power of (GUYE and GOUDER), A., ii, 134.
- iso*-Amylacetacetic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- tert*-Amylacetacetic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- iso*-Amylacetylacetone, action of sodium hydroxide on (BARBIER and BOUVEAULT), A., i, 638.
- Amylamine amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- iso*-Amylamine, action of carbon bisulphide on (PONZIO), A., i, 636.
- Amylamines (BERG), A., i, 8.
- iso*-Amylcarbamine, preparation of (HOFMANN LECTURE), T., 709.
- 3'-Amyl-2'-hexylquinoline (NIEMEN-

- TOWSKI and ORZECOWSKI), A., i, 188.
- 3'-Amyl-2'-hexylquinoline-1-carboxylic acid and its hydrochloride (NIE-MENTOWSKI and ORZECOWSKI), A., i, 188.
- Amylic alcohol, action of light on (RICHARDSON and FORTEY), T., 1349; P., 1896, 164.
- iso-Amylic alcohol, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- tert.-Amylic alcohol (*dimethylethylcarbinol*), heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- action of bromine on (IPATIEFF), A., i, 401.
- Amylic aromatic ethers, rotatory power of, compared with amylic ethers of the fatty series (WELT), A., i, 333.
- phenylic ether (WELT), A., i, 333.
- nitrite, action of sodium phenoxide on (MICHAEL), A., i, 594.
- Amylmalonic acid, amylic salt, rotatory power of (GUYE and GOUDET), A., ii, 135.
- iso-Amylmalonic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- action of ethylenic bromide on (BISCHOFF), A., i, 129.
- iso-Amylmalonic acid, sodio-ethylic salt, action of ethylic α -bromopropionate, α -bromobutyrate, α -bromoisobutyrate, and α -bromisovalerate on (BISCHOFF), A., i, 467.
- tert.-Amylmalonic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- β -iso-Amylnaphthalene (HOOKER), T., 1356, 1358.
- Amyl- α - ψ -nitrole. See Pentane, β -nitro- β -nitroso-.
- iso-Amyl- ψ -nitrole. See *as*-Dimethylpropylpseudonitrole.
- See iso-Pentane, β -nitro- β -nitroso-.
- Amylodextrin. See Dextrin.
- Amyloxamic acid, amylamine salt (BERG), A., i, 8.
- Amylpropyl- ψ -nitrole. See Octane, β -nitro- β -nitroso-.
- Amylsulphamic acid, amylamine salt of (PAAL and JÄNICKE), A., i, 235.
- Anæmia, experimental, in dogs (STOCKMAN), A., ii, 263.
- alterations in the blood in (MORACZENESKA), A., ii, 618.
- Anæsthetics as a cause of acetoneuria (ABRAM), A., ii, 264.
- Anagyrine and its aurichloride (PARTHEIL and SPASSKI), A., i, 657.
- Anagyris fætida*, alkaloids of (PARTHEIL and SPASSKI), A., i, 657.
- Analcite from Dresden (ZSCHAU), A., ii, 189.
- dehydration of, absorption of ammonia by (FRIEDEL), A., ii, 481, 482.
- Anaptychia*, occurrence of atranoric acid in different species of (ZOFF), A., i, 103.
- Andalusite from Bodenmais, Bavaria (WEINSCHENK), A., ii, 310.
- from Bohemia (KATZER), A., ii, 187.
- or dumortierite, from Argentina (JANNASCH), A., ii, 568.
- action of boric and hydrofluoric acids on (JANNASCH), A., ii, 576.
- Andesine from France and Sardinia (FOUQUÉ), A., ii, 532.
- Andesite, olivine, from New Zealand (SPEIGHT), A., ii, 192.
- Andradite from Algeria (GENTIL), A., ii, 115.
- from Canada (HOFFMANN), A., ii, 257.
- titaniferous, from Ontario (ADAMS and HARRINGTON), A., ii, 374.
- Andropogon Schænanthus*, composition of oil of (BERTRAM and GILDEMEISTER), A., i, 381.
- nardus*, composition of oil of (BERTRAM and GILDEMEISTER), A., i, 381.
- Anemonin, properties of methylic and ethylic salts of (MEYER), A., i, 623.
- o*-Anethoil (MOUREU), A., i, 647.
- m*-Anethoil (MOUREU), A., i, 647.
- p*-Anethoil, preparation of, from oil of aniseed (BOUCHARDAT and TARDY), A., i, 380, 448.
- magnetic rotatory power, &c., of (PERKIN), T., 1148, 1226, 1247.
- action of bromine on (HELL and GÜNTHERT), A., i, 20.
- dibromide and its bromo-derivative, bromoketones from (HELL), A., i, 170.
- brom-, dibromide, action of aniline on (HELL and GÜNTHERT), A., i, 20.
- action of alcohol on (HELL and GÜNTHERT), A., i, 20.
- p*-Anethoil, dibrom-, dibromide (HELL and GÜNTHERT), A., i, 21.
- aniline derivative of (HELL and GÜNTHERT), A., i, 21.
- ketone from, and its ammonia derivative (HELL and GÜNTHERT), A., i, 21.

iso-Anethoil, brom-, and its ketone oxidation product (HELL and GAAB), A., i, 293.

Angelica oil, products of distillation of (CIAMICIAN and SILBER), A., i, 595.

Anglesite, containing cerussite, from Broken Hill, N.S.W. (HAMMOND), A., ii, 256.

Anhalonium Lewinii, alkaloids of (LEWIN), A., i, 190; (HEFFTER), A., i, 267; (EWELL), A., i, 710.

Anhalonium Jourdanianum, alkaloid of (LEWIN), A., i, 194.

Anhalonidine, properties of (HEFFTER), A., i, 267.

Anhalonine and its salts, properties of (LEWIN), A., i, 194.

Anhydrides, action of hydrogen fluoride on (COLSON), A., i, 346.

Anhydrides. See also:—

Acetonylsuccinic acid, anhydride of.

π -Acetoxycamphoric anhydride.

Acetoxymaleic anhydride.

β -Acetylglutaric anhydride.

Acid, $C_{15}H_{20}O_2$, anhydride of.

Acids, $C_6H_{10}O_4$ and $C_7H_{12}O_4$, anhydrides of.

Anhydrocamphoric acid.

Benzoic anhydride.

Benzoylphthalic anhydride.

cyclo-Butane-1 : 3-dioxalylic anhydride.

cis- π -Camphanic acid.

trans- π -Camphanic acid.

Camphopyric anhydride.

Camphorenic anhydride.

Camphoric anhydride.

cis-Camphotricarboxylic acid.

trans-Camphotricarboxylic acid.

Citradibromopyrotartaric anhydride.

Citric-di- β -naphthalide.

$\alpha\alpha^1$ -Diethylglutaric acid.

Dihydroxymaleic anhydride.

Dimethylfumaric anhydride.

$\alpha\alpha^1$ -Dinnethylglutaric acid, anhydride of.

$\alpha\beta$ -Dimethylglutaric anhydride.

Dimethylmaleic anhydride.

Dimethylsuccinic anhydrides.

Diisopropylsuccinic anhydride.

Ethoxymaleic anhydride.

α -Ethylglutaric acid anhydride.

3-Fluoresceincarboxylic anhydride.

Glutaric anhydride.

Lactide.

Maleic anhydride.

α -Methylglutaric acid, anhydride of.

Methylisopropylsuccinic anhydride.

Pinoleglycol.

Phthalic anhydride.

Propionic anhydride.

Anhydrides. See:—

Propionylglycollic oxime anhydride.

iso-Propylglutaric anhydride.

Pyrotartaric anhydride.

Pyruvic- β -naphthil.

Succinic anhydride.

Tetramethylsuccinic anhydride.

$\alpha\alpha\alpha^1$ -Trimethylglutaric acid, anhydride of.

iso-Valeric anhydride.

Anhydrite, artificial (BRAUNS), A., ii, 111.

Anhydroacetonebenzil. See Diphenylhydroxycyclopentanone.

Anhydroacetonebenzilcarboxylic acid. See Diphenylhydroxycyclopentanecarboxylic acid.

Anhydroacetonedibenzil, reduction of (JAPP and LANDER), T., 745.

Anhydrocamphoric acid (MARSH and GARDNER), T., 76; P., 1895, 206.

Anhydrocamphoric acid (BREDT, ARNTZ, and HELLE), A., i, 653.

Anhydrodi-*o*-aminobenzophenone (SONDHEIMER), A., i, 505.

Anhydrodibenzylacetoacetic acid, ethylic salt of (JAPP and LANDER), T., 737; P., 1895, 146.

Anhydrodihydroxyhydrolapachol, synthesis of (HOOKER), T., 1370, 1378.

Anhydroenneaheptitol (APEL and TOLLENS), A., i, 115.

diformal (APEL and WITT), A., i, 405.

Anhydroformyl-*m*-nitro-*o*-aminobenzhydrazide (KRATZ), A., i, 366.

Anhydroglycopyrogallol (FRIEDLÄNDER and RÜDT), A., i, 607.

isatin derivative of, and its triacetate (FRIEDLÄNDER and RÜDT), A., i, 607.

Anhydroglycoresorcinol (FRIEDLÄNDER and RÜDT), A., i, 607.

Anhydrotetronic acid (WOLFF and SCHWABE), A., i, 524.

Anilaminobenzonylphenylimidine : its hydrochloride and pierate (VON PECHMANN), A., i, 32.

Aniline, discovery of (HOFMANN LECTURE), T., 597.

preparation of (HOFMANN LECTURE), T., 642.

composition of (HOFMANN LECTURE), T., 641.

magnetic rotatory power, &c., of (PERKIN), T., 1064, 1098, 1155, 1207, 1244.

action of cyanic acid on (HOFMANN LECTURE), T., 648.

action of cyanogen on (HOFMANN LECTURE), T., 590, 649.

- Aniline, action of cyanogen haloids on (HOFMANN LECTURE), T., 590.
 action of cyanogen chloride on (HOFMANN LECTURE), T., 649, 650.
 action of, on mercurous iodide (FRANÇOIS), A., i, 22.
 action of phosgene gas on (HOFMANN LECTURE), T., 649.
 chlorination of (HOFMANN LECTURE), T., 644.
 double compounds of, with metallic salts (SCHRÖDER VAN DER KOLK), A., ii, 578.
 estimation of water in (DOBRINER and SCHRANZ), A., ii, 403.
 estimation of, in toluidine (DOBRINER and SCHRANZ), A., ii, 402.
 Aniline and its salts, constitution of (HOFMANN LECTURE), T., 655.
 compounds of phosphoric acid with (HOFMANN LECTURE), T., 590.
 hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1111, 1159, 1218, 1235, 1246.
 Aniline, substitution products of, constitution of (HOFMANN LECTURE), T., 661.
 substitution of chlorine and bromine in (HOFMANN LECTURE), T., 645.
 Aniline, bromo-derivatives of, basic character of (HOFMANN LECTURE), T., 646.
p-brom-, action of ethylic bromide on (HOFMANN LECTURE), T., 661.
 2 : 4 : 5-*tribrom*-, salts of (JACKSON and GALLIVAN), A., i, 353.
 2 : 4 : 6-*tribrom*-, reduction of (JACKSON and CALVERT), A., i, 538.
 4 : 3-bromonitro-, and its salts (WHEELER), A., i, 23.
 6 : 3-bromonitro-, and its salts and acetyl derivative (WHEELER), A., i, 156.
m-chlor, preparation of (LÖB), A., i, 605.
 magnetic rotatory power, &c., of (PERKIN), T., 1106, 1131, 1205, 1244.
p-chlor-, preparation of (HOFMANN LECTURE), T., 645; (LÖB), A., i, 605.
 magnetic rotatory power, &c., of (PERKIN), T., 1106, 1131, 1205, 1244.
 action of ethylic bromide on (HOFMANN LECTURE), T., 661.
di-chlor-, preparation of (HOFMANN LECTURE), T., 645.
o-p-dichlor-, preparation of (CHATTAWAY and EVANS), T., 850; P., 1896, 98.
- Aniline, 2 : 4 : 6-*trichlor*-, preparation of (HOFMANN LECTURE), T., 644.
p-iodo-, preparation of (HOFMANN LECTURE), T., 649.
m-nitro-, preparation of (HOFMANN LECTURE), T., 646, 647.
 alkaline reduction of (MELDOLA and ANDREWS), T., 7; P., 1895, 214.
 action of ethylic bromide on (HOFMANN LECTURE), T., 661.
p-nitro-, electrolytic reduction of (NOYES and DORRANCE), A., i, 22.
 2 : 4-*dinitro*- (CURTIUS), A., i, 339.
- Aniline-black, action of sunlight on (OGLOBIN), A., i, 649.
 Aniline-blue. See Triphenylrosaniline.
 Aniline derivative of bromo- ψ -cumenol and salts (AUWERS and MARWEDEL), A., i, 150.
 Aniline-purple. See Mauve.
 Aniline-*o*-sulphonic acid (KREIS), A., i, 48.
p-brom- (KREIS), A., i, 48.
 Aniline-*m*-sulphonic acid (KREIS), A., i, 48.
p-brom- (KREIS), A., i, 48.
 Anilinoacetylazoimide, nitroso- (RADENHAUSEN), A., i, 138.
 Anilinoaposafranine (FISCHER and HEPP), A., i, 323.
 preparation of (O. FISCHER and DISCHINGER), A., i, 539.
 carbonate (KEHRMANN and HERTZ), A., i, 510.
 Anilinoaposafranone, formation of, from aposafranone (FISCHER and HEPP), A., i, 51.
 Anilinobenzylanilimidine : its hydrochloride and picrate (VON PECHMANN), A., i, 32.
 Anilinobenzylmethylimidine : its picrate and hydriodide (VON PECHMANN), A., i, 31.
 β -Anilinoacrotonic acid, amino-, ethylic salt of (HINSBERG and KOLLER), A., i, 537.
 4 - Anilino - 3 : 5-dinitrobenzoic acid (JACKSON and ITTNER), A., i, 214.
 4-Anilino-3 : 5-dinitrotoluene (JACKSON and ITTNER), A., i, 214.
 Anilinomethylbutylcarbinol (LIPP), A., i, 317.
 β -Anilino- α -methylbutyrolactone (WOLFF), A., i, 87.
 3 : 1-Anilinonaphthol (FRIEDLÄNDER and RÜDT), A., i, 569.
 Anilinophenylaposafranine (FISCHER and HEPP), A., i, 323.

- β -Anilinopropionic acid, ethylic salt of (HARRIES and LOTH), A., i, 321.
 nitroso-, ethylic salt of (HARRIES and LOTH), A., i, 321.
 Anilinosafrafranes. See Indulines.
 Anilinosafrafranol and its hydrochloride (FISCHER and HEPP), A., i, 325.
 Anilinetoluquinone (JACOBSON, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
 Anilocyanic acid. See Phenylcarbimide.
 Aniluvitonic acid. See Methylquinolinecarboxylic acid.
 Animal system, decomposition of amygdalin in (GÉRARD), A., ii, 570.
 Animals, behaviour of pentoses in (GOETZE and PFEIFFER), A., ii, 443.
 Anisaldehyde, from oil of aniseed (BOUCHARDAT and TARDY), A., i, 380, 448.
 preparation of (BOUVEAULT), A., i, 649.
 magnetic rotatory power, &c., of (PERKIN), T., 1128, 1136, 1200, 1242.
 dinitro- (WÖRNER), A., i, 227.
 m-nitro- (WÖRNER), A., i, 227.
 Anisaldehydhydrazone (BOUVEAULT), A., i, 650.
 Anissynaldoxime, velocity of formation of the *anti*-modification from (LEY), A., ii, 243.
 acetate, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.
 Aniseed, oil of, composition of (BOUCHARDAT and TARDY), A., i, 380, 448.
 Anisic acetone, from oil of anise (BOUCHARDAT and TARDY), A., i, 448.
 Anisic acid, from oil of aniseed (BOUCHARDAT and TARDY), A., i, 380, 448.
 magnetic rotatory power, &c., of the ethylic salt of (PERKIN), T., 1128, 1136, 1160, 1176, 1231.
 behaviour towards phenylic isocyanate of (HALLER), A., i, 32.
 Anisic alcohol, magnetic rotatory power and relative density of (PERKIN), T., 1123, 1136, 1199, 1242.
 Anisic camphor, from oil of aniseed (BOUCHARDAT and TARDY), A., i, 380.
 -Anisidine, magnetic rotatory power, &c., of (PERKIN), T., 1131, 1211, 1245.
 p-brom- (MELDOLA, WOOLCOTT, and WRAY), T., 1329.
 2 : 4-bromonitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1327 ; P., 1896, 164.
 o-Anisidine, p-nitro-, and its acetyl derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1329 ; P., 1896, 164.
 5-nitro-, and its acetyl derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1330 ; P., 1896, 164.
 p-Anisidine, magnetic rotatory power, &c., of (PERKIN), T., 1131, 1211, 1245.
 o-iod-, and its platinochloride, picrate, and acetyl derivative (REVERDIN), A., i, 475.
 p-Anisidinethiocarbamide, o-iod- (REVERDIN), A., i, 475.
 Anisoil (phenyl methyl oxide), magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1090, 1127, 1186, 1240.
 melting point of (v. SCHNEIDER), A., ii, 290.
 action of ethyloxalic chloride on (BOUVEAULT), A., i, 616.
 condensation of, with phthalic anhydride (GRANDE), A., i, 563.
 2 : 4-dibrom-, preparation of (HIRTZ), A., i, 532.
 bromo-m-iodo- (HIRTZ), A., i, 532.
 2 : 4-bromiodo- (HIRTZ), A., i, 532.
 4 : 2-bromiodo- (HIRTZ), A., i, 532.
 4-bromo-2-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1329.
 2 : 4-dibromonitro- (HIRTZ), A., i, 532.
 chlorobromo-m-iodo- (HIRTZ), A., i, 532.
 o-iodo- (REVERDIN), A., i, 475.
 m-iodo-, preparation of (HIRTZ), A., i, 532.
 p-iodo- (REVERDIN), A., i, 475.
 substance obtained in the nitration of (REVERDIN), A., i, 475.
 2 : 4-diiodo- (REVERDIN), A., i, 475.
 o-iodo-p-nitro- (REVERDIN), A., i, 475.
 p-iodo-o-nitro- (REVERDIN), A., i, 475.
 2 : 4-dinitro-, preparation of (MELDOLA, WOOLCOTT, and WRAY), T., 1330.
 Anisoldisulphonic acid, preparation of (HOFMANN LECTURE), T., 697.
 Anisoilphthaloylic acid (GRANDE), A., i, 563.
 Anisoilcarboxylic acid and its ethylic salt (BOUVEAULT), A., i, 616.
 Anisoilglyoxylic acid hydrazone (BOUVEAULT), A., i, 650.
 Anisuric acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.

Anisyl ethyl ketone and its oxime and semicarbazone (WALLACH and POND), A., i, 95.

Anisyleamphor, crystallography of (MINGUIN), A., i, 694.

3'-*p*-Anisyldihydro- β -phenotriazine and its salts (BUSCH and HARTMANN), A., i, 160.

3'-*o*-Anisyltetrahydroquinazoline (BUSCH), A., i, 507.

Annual General Meeting, T., 563; P., 1896, 80.

Anorthite from Etna (FOUQUÉ), A., ii, 532.

from Raymond, Me. (MELVILLE), A., ii, 38.

Anorthoclase from the Azores, Sardinia, and France (FOUQUÉ), A., ii, 532.

from Montana (WOLFF and TARR), A., ii, 37.

Anthracene, discovery of (HOFMANN LECTURE), T., 598.

fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.

distillation of (HOFMANN LECTURE), T., 630.

behaviour of, in sunlight (ORNDORFF and CAMERON), A., i, 176.

analysis of (BASSETT), A., ii, 580.

Anthracene, brom-, preparation of (HOFMANN LECTURE), T., 601; P., 1893, 138.

dibrom- (HOFMANN LECTURE), T., 633.

chlor-, preparation of (HOFMANN LECTURE), T., 601; P., 1893, 138.

dichlor-, action of sulphuric acid on (HOFMANN LECTURE), T., 631.

Anthracenedisulphonic acid, dichlor-, preparation of (HOFMANN LECTURE), T., 631.

Anthracene-dyes, action of sunlight on (OGLOBIN), A., i, 649.

Anthracenesulphonic acid, dichlor-, preparation of (HOFMANN LECTURE), T., 632.

Anthrachrysone, oxidation of (WACKER), A., i, 694.

Anthraconite, odour of (SKEY), A., ii, 184.

Anthraflavic acid, composition of, and its diacetyl and dibenzoyl derivatives (HOFMANN LECTURE), T., 633.

iso-Anthraflavic acid, discovery of (HOFMANN LECTURE), T., 633.

Anthranilic acid (*o*-aminobenzoic acid), action of acetaldehyde on (NIEMENTOWSKI and ORZECOWSKI), A., i, 187.

action of sodium hypochlorite on (DE CONINCK), A., i, 364.

Anthranilic acid, condensation of, with glyoxylic acid (BOETTINGER), A., i, 47.

condensation of, with phloroglucinol (NIEMENTOWSKI), A., i, 261.

action of heptaldehyde on (NIEMENTOWSKI and ORZECOWSKI), A., i, 188.

Anthranol, behaviour in sunlight (ORNDORFF and CAMERON), A., i, 176.

conversion into dianthranol (ORNDORFF and BLISS), A., i, 570.

Anthrapurpuramide, preparation of (HOFMANN LECTURE), T., 633.

Anthrapurpurin, formation and composition of (HOFMANN LECTURE), T., 633.

hydroxylation of (WACKER), A., i, 694.

Anthraquinone, discovery of (HOFMANN LECTURE), T., 601; P., 1893, 137.

fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.

hydroxylation of (WACKER), A., i, 693.

dibromo-, derivatives of (HOFMANN LECTURE), T., 633.

Anthraquinone group of natural yellow colouring matters (PERKIN), T., 1441; P., 1896, 167.

1-Anthraquinonecarboxylic acid and its ethylic salt (GRAEBE and LEONHARDT), A., i, 437.

Anthraquinonedisulphonic acid, preparation of (HOFMANN LECTURE), T., 631.

Anthraquinoneoxime, methyl, ethyl, and benzyl ethers (SCHUNCK and MARCHLEWSKI), T., 73; P., 1895, 203.

Anthraquinonesulphonic acid, formation of (HOFMANN LECTURE), T., 629.

Antimonial silver chloride from Broken Hill, N.S.W. (SMITH), A., ii, 30.

Antimoniomalic acid, ammonium salt of (HENDERSON and BARR), T., 1452; P., 1896, 168.

Antimoniomucic acid, salts of (HENDERSON and BARR), T., 1453; P., 1896, 168.

Antimony, solution and diffusion in mercury of (HUMPHREYS), T., 1679; P., 1896, 220.

Antimony-alloys with aluminium (GAUTIER), A., ii, 602.

with iron, specific gravity and specific heat of (LABORDE), A., ii, 652.

with silver, melting points of (GAUTIER), A., ii, 646.

Antimony trichloride, action of potassium bromide and iodide on (SNAPE), A., ii, 641.

- antimony pentachloride, action of, on carbon bisulphide (HOFMANN LECTURE), T., 700.
- sulphide, physical change produced by gently heating (SPRING), A., ii, 290.
- effect of high temperature on (MOURLOT), A., ii, 603.
- Sulphantimonites and sulpharsenites, relations between (PENFIELD), A., ii, 659.
- Triethylstibine, discovery of (HOFMANN LECTURE), T., 671.
- antimony, estimation of, in alloys with lead, tin, and arsenic (ANDREWS), A., ii, 501.
- separation of, from mercury (JANNASCH), A., ii, 675.
- antipeptone. See Peptones.
- antipyrine: its zinc chloride and iodide and its compound with mercurous and mercuric nitrates (VAN ITALLIE), A., i, 260.
- thiocyanate and mercuric chloride of (SCHUYTER), A., i, 575.
- action of catechol, guaiacol, resorcinol, and quinol on (PATEIN and DUFAY), A., i, 188.
- compounds of, with hydroxybenzoic acids (PATEIN and DUFAY), A., i, 650.
- detection of (CARREZ), A., ii, 584.
- estimation of, volumetrically (SCHUYTEN), A., ii, 486.
- antiseptic, cadmium as an (PADERI), A., ii, 491.
- apatite from Canaan, Conn. (HOBBS), A., ii, 34.
- variations in the composition of (CARNOT), A., ii, 611.
- plumbiferous, from Broken Hill, N.S.W. (LIVERSIDGE), A., ii, 657.
- biolaldehyde, preparation of (CIAMICIAN and SILBER), A., i, 608.
- birole (CIAMICIAN and SILBER), A., i, 608.
- brom-, dibromide (CIAMICIAN and SILBER), A., i, 608.
- Apiole (CIAMICIAN and SILBER), A., i, 608.
- brom-, bromide (CIAMICIAN and SILBER), A., i, 608.
- biolcketonc acid (CIAMICIAN and SILBER), A., i, 608.
- biolic acid, preparation of (CIAMICIAN and SILBER), A., i, 608.
- biolone (CIAMICIAN and SILBER), A., i, 608.
- tribrom- (CIAMICIAN and SILBER), A., i, 608.
- apophyllenic acid (BLUMENFELD), A., i, 30; (KOENIGS and WOLFF), A., i, 698.
- Apophyllite from Algeria (GENTIL), A., ii, 114.
- action of water on (SPEZIA), A., ii, 257.
- fluorine and ammonium chloride in (NORDENSKIÖLD), A., ii, 369.
- Apopilocarpine, identity of, with cytisine (DE MOER), A., i, 657.
- Aposafraanine, synthesis of (KEHRMANN and BERGIN), A., i, 629.
- formation of, from phenosafraanine and from anilidoaposafranine (FISCHER and HEPP), A., i, 51.
- benzoyl derivative of (FISCHER and HEPP), A., i, 51.
- hydrochloride, formula of (FISCHER and HEPP), A., i, 323.
- Aposafraanone, action of aniline on, and formation of from anilinoaposafranine (FISCHER and HEPP), A., i, 51.
- Apparatus for accelerating reactions by mixing (MARKOWNIKOFF), A., ii, 297.
- for experiments under pressure (WALTER), A., ii, 297.
- for extraction (v. RIJN), A., ii, 17.
- for washing precipitates with boiling water (JEWETT), A., ii, 123.
- Apples, estimation of zinc in dried (LEGLER), A., ii, 450.
- Araban, occurrence of, in plants (YOSHIMURA), A., ii, 60.
- occurrence of, in *Sterculia plantunifolia* (YOSHIMURA), A., ii, 60.
- Arabinose, action of alcoholic ammonia on (DE BRUYN and VAN LEENT), A., i, 119.
- action of fuming nitric acid on (BADER), A., i, 405.
- estimation of, by Fehling's solution (KJELDAHL), A., ii, 581.
- Arabinose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Arabinose-amine (DE BRUYN and VAN LEENT), A., i, 119.
- Arabinose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Arabinose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Arabinosebenzylmercaptal (LAWRENCE), A., i, 272.
- Arabinose-ethylenemercaptal (LAWRENCE), A., i, 272.
- Arabinose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Arabinosenaphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Arabinosetrimethylenemercaptal (LAWRENCE), A., i, 272.

- Arabinosotrihydroxyglutaric acid, anhydride of (BADER), A., i, 405.
 Arabitol diacetone (SPEIER), A., i, 77.
l-Arabonic acid (*tetrahydroxyvaleric acid*), velocity of lactone formation of (HJELT), A., i, 597.
 Arachidic acid (SPIECKERMANN), A., i, 410.
 Aragonite, action of magnesium solutions on (KLEMENT), A., ii, 116.
 Arfvedsonite, alteration of, to acmite (USSING), A., ii, 372.
 Argentite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
 Argentoacetoguanamide. See under 6-Methyl-2 : 4-dioxytriazine.
 Arginine, formation of, from proteid substances (HEDIN), A., i, 193.
 from sturine (KOSSEL), A., i, 582.
 occurrence of, and physiological action of (SCHULZE), A., ii, 383.
 separation of glutamine from (SCHULZE), A., ii, 572.
 Argon, discovery of, in the atmosphere (RAYLEIGH and RAMSAY), A., ii, 99.
 percentage of, in air (SCHLOESING), A., ii, 166.
 occurrence of, in air and water (KAYSER), A., ii, 19.
 in mineral waters (BOUCHARD), A., ii, 117; (MOUREU), A., ii, 298; (KELLAS and RAMSAY), A., ii, 655.
 absence of, in mineral waters of Albano (NASINI and ANDERLINI), A., ii, 366.
 in sulphuretted waters (TROOST and OUVARD), (BOUCHARD), A., ii, 298.
 presence of, in samples of marsh gas (SCHLOESING), A., i, 401.
 in firedamp and coal (SCHLOESING), A., ii, 655.
 atomic weight of (HILL), A., ii, 16; (RAYLEIGH and RAMSAY), A., ii, 105.
 molecular formula of (NASINI), A., ii, 245.
 position of, in the periodic system (HILL), A., ii, 16; (DEELEY), A., ii, 418; (PREYER), A., ii, 418.
 homogeneity of (RAMSAY and COLLIE), A., ii, 645.
 refractivity of (RAYLEIGH), A., ii, 598.
 spectrum of (RAYLEIGH and RAMSAY), A., ii, 103; (FRIEDLÄNDER), A., ii, 457.
 blue spectrum of (KAYSER), A., ii, 2.
 fluorescence spectrum of (DORN and ERDMANN), A., ii, 2.
 three different spark spectra of (EDER and VALENTA), A., ii, 405.
 Argon, behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.
 expansion of, by heat (KUENEN and RANDALL), A., ii, 598.
 boiling point and critical data of (RAYLEIGH and RAMSAY), A., ii, 104.
 advantages of, as a thermometric substance (QUINAN), A., ii, 407.
 velocity of sound in (RAYLEIGH and RAMSAY), A., ii, 104.
 density of (RAYLEIGH and RAMSAY), A., ii, 103, 106; (RAYLEIGH), A., ii, 598.
 viscosity of (RAYLEIGH), A., ii, 599.
 solubility of, in water (RAYLEIGH and RAMSAY), A., ii, 104.
 chemical analogies of (HILL), A., ii, 418.
 chemical behaviour of (RAYLEIGH and RAMSAY), A., ii, 105.
 combination of, with magnesium (TROOST and OUVARD), A., ii, 99.
 a possible compound of (RAMSAY), A., ii, 20.
 carbon compound of, spectrum of the (CROOKES), A., ii, 2.
 percentage of, in expired air (KELLAS), A., ii, 661.
 presence of, in the air-bladder of fishes (SCHLOESING and RICHARD), A., ii, 436.
 estimation of (SCHLOESING), A., ii, 166, 219.
 separation of, from nitrogen (LIMB), A., ii, 299.
 Aristidinic acid (HESSE), A., i, 180.
 Aristinic acid and its salts (HESSE), A., i, 180.
 Aristolic acid (HESSE), A., i, 180.
 Aristolin (HESSE), A., i, 180.
Aristolochia argentina, constituents of the root of (HESSE), A., i, 180.
 Aristolochic acid (HESSE), A., i, 180.
 Aristolochine (HESSE), A., i, 180.
 Arite from Sardinia (LOVISATO), A., ii, 183.
 Arsenic, vapour density of (BILZ), A., ii, 152.
 action of magnesium on solutions containing (VITALI), A., ii, 420.
 action of, on plants (STOKLASA), A., ii, 538.
 in coal (DOHERTY), A., ii, 566.
 Arsenic trichloride, action of potassium bromide and iodide on (SNAPE), A., ii, 641.
 trihydride (*arsine*), influence of the walls of the containing vessel on the rate of decomposition of (COHEN), A., ii, 593.

estimation of (DENIGÈS), A., ii, 387.

Arsenic Oxides :—

Trioxide, molecular formula as vapour and in solution (BILZ), A., ii, 152.

Arsenites, detection of (TARUGI), A., ii, 548.

detection of, in presence of chromates (TARUGI), A., ii, 340.

Arsenites, thio-, and thioantimonites, crystallographic relations between (PENFIELD), A., ii, 659.

Arsenates, detection of (ANTONY), A., ii, 390.

Arsenic acid, seleno-, salts of (SZARVASY), A., ii, 98.

oxyselenoarsenic, and thio-selenoarsenic acids, salts of (CLEVER and MUTHMANN), A., ii, 18.

thio- (McCAY), A., ii, 359.

Arsenic diselenotersulphide (SZARVASY), A., ii, 98.

triselenobisulphide (SZARVASY), A., ii, 98.

pentaselenide (CLEVER and MUTHMANN), A., ii, 18; (SZARVASY), A., ii, 98.

sulphide, physical change produced by gently heating (SPRING), A., ii, 290.

hydrated, and its decomposition by pressure (SPRING), A., ii, 97.

Arsenic, detection of, in alloys of tin and lead (DE KONINGH), A., ii, 273.

detection of, in the presence of selenium (DAWYDOW), A., ii, 219.

estimation of (ENGEL and BERNARD), A., ii, 448; (GAUTIER), A., ii, 449.

estimation of, as ammonium magnesium arsenate (FRIEDHEIM and MICHAELIS), A., ii, 74.

estimation of, as trisulphide (FRIEDHEIM and MICHAELIS), A., ii, 74.

estimation of, in alloys with lead, tin, and antimony (ANDREWS), A., ii, 501.

estimation of, in iron ores, steel, and pig-iron (STEAD), A., ii, 390.

estimation of, in crude sulphuric acid (HATTENSAUR), A., ii, 390.

estimation of, in glycerol (BARTON), A., ii, 499.

separation of cobalt from (JANNASCH and LEHNERT), A., ii, 547.

separation of iron and manganese (JANNASCH and KAMMERER), A., ii, 221.

separation electrolytically from gold (SMITH and WALLACE), A., ii, 220.

separation of mercury from (JANNASCH), A., ii, 676.

Artemisia maritima, artemisin from (MERCK), A., i, 59.

Artemisin from *Artemisia maritima* (MERCK), A., i, 59.

Artocarpus integrifolia, colouring matters of (PERKIN and BABLICH), T., 792; P., 1896, 106; (PERKIN), T., 1440; P., 1896, 167.

Asbeferrite from Pennsylvania (GOLD-SMITH), A., ii, 36.

Asbestos from Bosnia (FOULLON), A., ii, 483.

Asbolite from Brussels (CROCQ), A., ii, 434.

Ascharite, formula of (KOSMANN), A., ii, 368.

Asparagine in hops (BEHRENS), A., ii, 207.

in young plants of *Vicia sativa* (SCHULZE), A., ii, 208.

in certain vegetables (KINOSHITA), A., ii, 61.

from maleic anhydride and alcoholic ammonia (PIUTTI), A., i, 669.

from ammonia and aspartamide (PIUTTI), A., i, 668.

action of sodium hypochlorite on (DE CONINCK), A., i, 282.

conversion of, into bromosuccinic acids (WALDEN), A., i, 205.

formation of, during germination (PRIANISCHNIKOFF), A., ii, 380.

formation of, in plants supplied with nitrates and ammonia (KINOSHITA), A., ii, 54.

formation of proteids from, in plants (KINOSHITA), A., ii, 54.

part played by, in nutrition of plants (LOEW), A., ii, 57.

in nodules, amount of nitrogen as (STOKLASA), A., ii, 205.

detection of (MOULIN), A., ii, 629.

Asparagine group, presence of, in legumin and vegetable albumin (FLEURENT), A., i, 112.

Aspartamide (PIUTTI), A., i, 669.

action of aqueous ammonia on (PIUTTI), A., i, 668.

Aspartic acid, configuration of (FISCHER), A., i, 526.

rotatory power of (MARSHALL), T., 1022; P., 1896, 146.

preparation of *l*-bromo- and *l*-chlorosuccinic acid from (WALDEN), A., i, 205.

inactive, ammonium salt of (TANATAR), A., i, 520.

Aspergillus niger, assimilation of nitrogen by (PURIEWITSCH), A., ii, 571.

- Aspergillus niger*, mineral nutrition of (BENECKE), A., ii, 572.
 inversion of cane-sugar by (FERMI and MONTESANO), A., ii, 493.
 action of, on aleoholic fermentation (BOURQUELOT and HÉRISSEY), A., ii, 321.
 emulsin from (BOURQUELOT and HÉRISSEY), A., i, 195.
 extraction of maltase from (BOURQUELOT), A., i, 111.
 Asphalt, artificial production of, from petroleum (MABERY and BYERLEY), A., i, 329.
Asphodelus ramosus, fermentation of (RIVIÈRE and BAILHACHE), A., 203.
Aspidium filix mas, cell-membranes of (WINTERSTEIN), A., ii, 210.
Asplenium filix fem., cell-membranes of (WINTERSTEIN), A., ii, 210.
 Assimilation. distinction between elaboration and (CROSS, BEVAN, and SMITH), T., 1605 ; P., 1896, 174.
 of plants, effect of abundant application of nitrogen on (MÜLLER), A., ii, 54.
 of plants, formation of proteids and carbohydrates in (SAPOSCHNIKOFF), A., ii, 537.
 of nitrogen from nitrates and ammonia by plants (KINOSHITA), A., ii, 55.
 of nitrogen by moulds (PURIEWITSCH), A., ii, 571.
 of lecithin by plants (STOKLASA), A., ii, 266.
 Assimilation. See further under Agricultural Chemistry (Appendix).
 Association, molecular, in liquids (ESTREICHER), A., ii, 150.
 of molecules in liquids, effect on the heat of evaporation of (LINEBURGER), A., ii, 9.
 Asymmetry and symmetry, molecular (GROTH), A., ii, 159 ; (LADENBURG), A., ii, 244.
 Atisine, extraction of, from the root of *Aconitum heterophyllum* and its purification (JOWETT), T., 1519 ; P., 1896, 158.
 properties and salts of (JOWETT), T., 1521 ; P., 1896, 158.
 action of alkalis and acids on (JOWETT), T., 1525 ; P., 1896, 159.
 Atmospheric air, specific heat of (AMAGAT), A., ii, 349.
 liquefaction of (DEWAR), P., 1895, 221 ; (BLOUNT), P., 1895, 232.
 presence of argon and helium in (KAYSER), A., ii, 19.
 attempt to detect helium in (RAYLEIGH), A., ii, 599.
 Atmospheric air, possible occurrence of hydrogen and methane in (PHILLIPS), A., ii, 162.
 origin of the oxygen of (PHIPSON), A., ii, 265.
 expired, percentage of argon in (KELLAS), A., ii, 661.
 and atmospheric, percentage of argon in (KELLAS), A., ii, 661.
 estimation of carbonic anhydride in (HENRIET), A., ii, 624.
 estimation of carbonic anhydride in, apparatus for (HEIDENHAIN), A., ii, 337.
 estimation of carbonic oxide in (HALDANE), A., ii, 76.
 estimation of oxygen in (KREIDER), A., ii, 124.
 Atomic theory, the origin of Dalton's (DEBUS), A., ii, 639.
 Atomic weight or weights of the elements (L. MEYER), (BEDSON), T., 1423 ; P., 1896, 119.
 of the elements, relation between (LEA), A., ii, 594.
 pairs of elements with approximately equal (LORENZ), A., ii, 639.
 of argon (HILL), A., ii, 16 ; (RAYLEIGH and RAMSAY), A., ii, 105.
 of carbon (WANKLYN), A., ii, 165.
 of cobalt (HEMPEL and THIELE), A., ii, 302.
 of helium (LANGLET), A., ii, 99.
 probable, of constituents of helium (RUNGE and PASCHEN), A., ii, 2.
 of oxygen and hydrogen, ratio of the (THOMSEN), A., ii, 244.
 of oxygen (HILL), A., ii, 17 ; (THOMSEN), A., ii, 244, 471 ; (MORLEY), A., ii, 644.
 of tellurium (STAUDENMAIER), A., ii, 97.
 of Japanese tellurium (CHIKASHIGÉ), T., 881 ; P., 1896, 151.
 of tungsten (SCHNEIDER), A., ii, 428.
 of zinc (RICHARDS and ROGERS), A., ii, 21.
 Atoms, analogy of, with vortex rings (FITZGERALD), T., 889 ; P., 1896, 25.
 forces acting between (FITZGERALD), T., 901.
 Atranoric acid, occurrence and properties of (ZOPF), A., i, 103.
 Atropine, action of, on embryonic heart (PICKERING), A., ii, 46.
 influence of, on secretion of urine (WALTI), A., ii, 666.
 effect of, on germination of seeds (Mosso), A., ii, 326.
 titration of, by iodine (KIPPENBERGER), A., ii, 682.

- Atroseine, nature of (SCHMIDT), A., i, 712.
 and salts from commercial scopolamine (HESSE), A., i, 656.
- Augite from Bohemia (HIBSCH), A., ii, 117, 534.
 from Colorado (EAKINS), A., ii, 39.
 from Renfrew, New Jersey (WÜLFING), A., ii, 432.
- Aurin, isomeric acetyl derivatives of (HERZIG), A., i, 486.
- Autodigestion in organs after death (BIONDI), A., ii, 616.
- Autumnixanthin (STAATS), A., i, 181.
- Avenalin, the proteid of oat-kernel (OSBORNE and CAMPBELL), A., i, 716.
- Avenor elatior*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Awaruite from Zermatt (ASTON and BONNEY), A., ii, 611.
- Azelaic acid (BEHREND), A., i, 410.
 from the oxidation of undecolic acid (KRAFFT), A., i, 665.
- bis*-Azimethylenes (SCHOLTZ), A., i, 343.
- Azimides. See Azoimides.
- Azimidobenzene, from benzeneazimidole (ZINCKE), A., i, 430.
 nitro-, methyl derivative (ZINCKE and HELMERT), A., i, 301.
- 3:4-Azimidobenzoic acid and its salts and acetyl derivative (ZINCKE and HELMERT), A., i, 550.
- Azimidoethylenedicarboxylic acid (ZINCKE and HELMERT), A., i, 550.
- Azimido- μ -methylthiazole- α -carboxylic acid (WEIDEL and NIEMIŁOWSKI), A., i, 106.
- Azimido-*m*-uramidobenzoic acid (ZINCKE and HELMERT), A., i, 548.
- Azimido-*p*-uramidobenzoic acid (ZINCKE and HELMERT), A., i, 549.
- Azinemethanedisulphonic acid, potassium salt (VON PECHMANN), A., i, 678.
- Azines, reduction of (CURTIUS), A., i, 339.
- Azinesuccinic acid, ethylic salt, action of heat on (CURTIUS), A., i, 337, 338.
- Azoacetic acid, reduction of (CURTIUS), A., i, 338.
- Azobenzene, preparation of (LÖB), A., i, 605.
 heat of combination with benzene in the liquid and solid states (PICKERING), A., ii, 148.
 behaviour of, towards phenylhydrazine (WALTHER), A., i, 543.
 condensation with benzaldehyde. See Benzaldehyde.
- Azobenzene, amino-, behaviour of, towards phenylhydrazine (WALTHER), A., i, 543.
- Azobenzene, *p*-amino-, decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
di-m-diamino-, bisazimide, diacetyl and dibenzoyl derivatives, oxalate, azo- β -naphthol derivative (MELDOLA and ANDREWS), T., 10; P., 1895, 215.
di-m-diamino-, behaviour of, towards *p*-nitrodiazobenzene chloride (MELDOLA and ANDREWS), T., 13.
diiodo-, from *di-m*-diaminoazobenzene (MELDOLA and ANDREWS), T., 13; P., 1895, 215.
- Azobenzimide. See Benzazoimide.
- Azo-*o*-benzyl-*o*-anisidine (BUSCH, BRUNNER, and BIRK), A., i, 160.
- Azoisobutyronitrile (THIELE and HEUSER), A., i, 341.
- Azo-colouring matters, formation of (VAUBEL), A., i, 28.
- Azo-compounds, action of sunlight on (OGLOBIN), A., i, 649.
- Azodiisobutyramide (THIELE and HEUSER), A., i, 342.
- Azodiisobutyric acid, amidoxime of (THIELE and HEUSER), A., i, 342.
 ethylic salt (THIELE and HEUSER), A., i, 342.
 imidoethyl ether, hydrochloride of (THIELE and HEUSER), A., i, 342.
 imidomethyl ether, hydrochloride of (THIELE and HEUSER), A., i, 342.
 methylic salt (THIELE and HEUSER), A., i, 342.
- Azodiisobutyronitrile (THIELE and HEUSER), A., i, 342.
- Azodimethylnaphthalene (CANNIZZARO and ANDREOCCI), A., i, 488.
- Azodinaphthyldiamine. See Azo-naphthalene, amino-.
- Azoimide, general account of (CURTIUS), A., i, 337.
 formation of (CURTIUS), A., i, 338.
 ammonium salt (CURTIUS), A., i, 338, 339.
 hydrazine salt (CURTIUS), A., i, 339.
 sodium salt, electrolysis of (PERATONER), A., ii, 245.
 benzoyl, glycolyl, malonyl, and succinyl derivatives of (CURTIUS), A., i, 34, 35.
- Azoimide from *m*-dinitrodiphenylamine, and its methiodide (ZINCKE and HELMERT), A., i, 300.
 from hydroxyazobenzene, and its methiodide (ZINCKE and HELMERT), A., i, 301.
- Azoimides (CURTIUS), A., i, 339.
 constitution of (ZINCKE and HELMERT), A., i, 300.

Azoimides, action of water and of alcohol on (CURTIUS), A., i, 340.

Azoimidocarbonic acid, methylic salt (CURTIUS and HEIDENREICH), A., i, 143.

Azonaphthalene, amino-, discovery of (HOFMANN LECTURE), T., 603; P., 1893, 138.

Azonium compounds from phenyl-*o*-phenylenediamine and β -naphthaquinonesulphonic acid (KEHRMANN and LOCHER), A., i, 700.

Azophenylethyl. See Benzeneazoethane.

o-Azophenylic ether (HAEUSSERMANN and TEICHMANN), A., i, 533.

p-Azophenylic ether (HAEUSSERMANN and TEICHMANN), A., i, 533.

Azotetrazole, electrolytic conductivity of solutions of the sodium salt of (BAUR), A., ii, 144.

m-Azotoluene: its dibenzylidene and di-orthohydroxybenzylidene derivatives (JACOBSON and FABIAN), A., i, 97.

Azotrinaphthyldiamine, preparation of (HOFMANN LECTURE), T., 621.

Azoxybenzene, behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.

di-m-amino-, dihydrochloride, diacetyl derivative, bisazimide, azo- β -naphthol derivative (MELDOLA and ANDREWS), T., 7; P., 1895, 215.

*di*odo-, from *di-m*-aminoazoxybenzene (MELDOLA and ANDREWS), T., 10; P., 1895, 215.

Azoxydimethylaniline, preparation of (EDELEANU and ENESCU), A., i, 359.

Azoxyphenyl-*p*-tolyl ketone and its oxime (LIMPRICHT and LENZ), A., i, 41.

Azoxyphenyl *m*-xylyl ketone. See Phenyl *m*-xylyl ketone, azoxy-

Azo-compounds. See preceding entries and also :—

Benzeneazimidole.

Benzene-4-azo-2-acetamidophenol.

Benzene-4-azo-2-aminophenol.

Benzeneazo-*m*-cresotol.

Benzeneazo-*o*-cresotol.

Benzeneazocyanacetic acid.

Benzeneazoethane.

Benzeneazoguaiacol.

Benzeneazoimidoformyl cyanide.

Benzeneazophenetoil.

Benzeneazoresoreinoloxime.

Benzeneazosalicylic acid.

Benzeneazoximidoresoreinol.

Benzenediazonium derivatives.

Benzenediazosulphonic acid.

Benzene-6 : 1-diazoxide.

Benzenylazoximeethenyl.

Azo-compounds. See :—

Benzoyl-*p*-hydroxyazobenzene.

Benzylideneazine.

Carbohydrazimine.

m-Cresolbisazo-*o*-toluene.

m-Cresolbisazo-*m*-toluene.

m-Cresolbisazo-*p*-toluene.

Diazoacetophenone.

Diazoaminobenzene.

Diazoaminosulphanilic acid.

Diazobenzene.

Diazobenzene anhydride.

Diazobenzenemercaptan hydrosulphide.

Diazobenzene sulphide.

Diazobenzene bisulphide.

iso-Diazobenzene hydroxide.

Diazobenzenehydroxyamidobenzyl.

Diazobenzenehydroxyamidomethane.

Diazobenzeneimide.

Diazobenzenesulphonic acid.

iso-Diazobenzenesulphonic acid.

Diazobenzenethiophenyl ether.

Diazo-*p*-chlorobenzene tribromide.

Diazo-hydroxyamidobenzene.

Diazomesitylene iodide.

Diazomethanedisulphonic acid.

Diazoniumanthranilic acid.

Diazoperhaloids.

Diazophenol hydrosulphides.

Diazophenols.

Diazophenolsulphonic acids.

p-Diazo-*p*-phenoxybenzoic acid.

Diazophenylinduline.

Diazopiperonylacetone.

Diazosalicylic acid.

Diazosulphanilic acid thiophenyl ether.

Diazotoluene.

Diazotoluene anhydride.

iso-Diazo-*p*-toluene.

6 : 1-Diazoxy-2-anisole.

3 : 2-Diazoxyphenol.

iso-Dihydrotetrazine.

Dimethylazobenzenes.

Diphenyleneazone.

Disazo-compound, $C_{14}H_{12}N_4$, obtained from *m*-aminobenzoic acid.

Formazyl hydride.

Formazyl-*p*-hydroxybenzene.

Formazyl-*p*-methoxybenzene.

Hydroxydiazonaphthalenesulphonic acid.

Malonenediazoximedibenzyl.

Malonenediazoxime-ethenyl.

Mesityldiazonium triiodide.

Methylazobenzenes.

Methylethenyldiazophenylamidine.

1 : 2 : 3-Naphthaleneazohydroxy-naphthoic acid.

β -Naphthylazocarboxylamide.

o- and *p*-Phenetoilazo-*p*-phenetoils.

zo-compounds. See :—

o-, *m*-, and *p*-Phenetoilazo-*p*-phenols.
Phenylazocarbonanilide.
Phenylazocarboxylic acid and amide.
Phenyldiazosulphonic acid.
Phenyl-*p*-diazotolylsulphone.
Phenylmethylpyrazoloneazobenzene.
Phenyl- α -*p*-nitrophenyl-*h*-phenyl-
methylformazyl.
Phenylthiodiazobenzene.
Tetramethylazoxyaniline.
Tetramethyldiamino- α -azonaphthal-
ene.
Tetrazine.
Tetrethyldiamino- α -azonaphthalene.
o-, *m*-, and *p*-Tolueneazo-*o*-cresetols.
o-, *m*-, and *p*-Tolueneazo-*m*-cresetols.
m-Tolueneazo-*o*-cresol.
o-, *m*-, and *p*-Tolueneazo-*m*-cresols.
o-, *m*-, and *p*-Tolueneazophenetoils.
o-Tolueneazophenol.
o-Toluenediazoamidobenzenesulph-
onic acid.
Trimethylazoxyaniline.
n-Xyleneazophenetoil.
n-Xyleneazophenol.

Azoimides :—

Benzoylazoimide.
Glycolylazoimide.
Hippurylazoimide.
o-, *m*-, and *p*-Hydroxybenzoylazo-
imides.
Malonylazoimide.
Phenylazoimide.
Phenylcarbamazoimide.
iso-Phthalylazoimide.
Succinylazoimide.
Terephthalylazoimide.
bis-Toluenediazoimide.

Hydrazo compounds :—

Acetaidehydephenylhydrazone.
Acetoacetonylhydrazide.
Acetohippurylhydrazide.
Acetohippurylphenylhydrazide.
Acetohydrazide.
Acetonyl-*o*-benzoiesulphinide-
hydrazone.
Acetylbutylie alcohol, phenylhydr-
azone of.
Acid, $C_{15}H_{20}O_2$, phenylhydrazide
of.
Aldehydeitrazinic acid, phenyl-
hydrazine derivative of.
Anisaldehydehydrazone.
Anisylglyoxylic acid hydrazone.
Arabinose, ethyl-, amyl-, allyl-,
benzyl-, and naphthyl-hydra-
zones of.
Benzaldehydephenylhydrazone.
Benzhydrazide.
Benzoindiearboxylic acid, osazone
of.

Azo-compounds. See :—

Benzoylcoumaronehydrazone.
Benzoylmethylie phenylie ether
phenylhydrazone.
Benzoylveratrolphenylhydrazone.
Desylacetophenonehydrazide.
Diazobenzenebenzoylhydrazine.
Diazobenzenephenylhydrazone-
methanedisulphonic acid.
Dibenzylhydrazine.
Dicarboxyphenylglyoxylic acid
phenylhydrazone.
Diphenylhydrazine.
Dihippurylhydrazine.
Dimethylhydrazobenzenes, 2 : 4-
and 4 : 3'.
2 : 6-Dimethyloctan-3-onoie acid,
carbazono of.
Diphenylearbazidediearboxylic
acid.
Diphenylene-*o*-dihydrazine.
Diphenyl-4 : 5-octanedione, di-
phenylhydrazone of.
Ethoxyphenylhydrazine.
Fluorenonephenylhydrazone.
Galactose, ethyl-, amyl-, benzyl-,
allyl-, and naphthyl-hydrazones
of.
Glucose, ethyl-, amyl-, benzyl-,
allyl-, and naphthyl-hydrazones
of.
Hippuryleinnamylidenhydrazine.
Hippurylhydrazine.
Hydrazioxalyl.
Hydrazobenzene.
Hydrazonephenylglyoxylic acid.
p-Hydrazophenylic ether.
Hydroxynaphthalenesulphonic acid,
hydrazo-.
Hydroxyphenylethyl propyl
ketone phenylhydrazone.
Hydroxystyryl propyl ketone
phenylhydrazone.
Lactose, ethyl-, amyl-, allyl-,
benzyl-, and naphthyl-hydra-
zones of.
 β -Lactylphenylhydrazide.
Mannose, ethyl-, amyl-, allyl-,
benzyl-, and naphthyl-hydrazones
of.
Menthonementhylhydrazone.
Menthylhydrazine.
Methoxybenzaldehydehydrazone.
o-Methoxybenzophenonephenyl-
hydrazone.
Methylanilidobutyl ketone phenyl-
hydrazone.
Methylacetonediearboxylic acid
phenylhydrazone, methylie salt of
3-Methyl-5-*isobutyl*- Δ_2 -*cyclohex*-
enone and its carboxylic acids,
phenylhydrazones of.

Azo-compounds. See :—

Methylbutylhydrazine.
 3-Methyl-5-hexyl- Δ_2 -cyclohex-
 enone and its carboxylic acids,
 phenylhydrazones of.
 Methylhydrazobenzenes.
 α -Methylphenylhydrazine.
 Methylpropylbenzaldehydhydra-
 zone.
 Naphthylbenzylhydrazine.
 Oxydimethylnaphthol phenyl-
 hydrazone.
 Phenacyl-*o*-benzoiesulphinide-
 hydrazone.
 Phenylaminobenzylhydrazine.
 Phenylbenzylidenehydrazone.
 Phenylbenzylidenemethylhydra-
 zine.
 Phenylisobutylidenehydrazone.
 Phenylformylhydrazide.
 Phenylhydrazine.
 Phenylhydrazinedisulphonic acid.
 Phenylhydrazinoacetamide.
 Phenylhydrazinoacetanilide.
 Phenylhydrazinoacetophenylhydra-
 zide.
 Phenylhydrazinoformic acid.
 β -Phenylhydrazinopropionic acid.
 Phenylhydrazonemethanedisulph-
 onic acid.
 Phenyl hydroxystyryl ketones,
 phenylhydrazones of.
 Phenylmethylisobutylidenehydra-
 zine.
 Phenylmethylhydrazine.
 Phenyl *p*-tolyl ketone phenylhydra-
 zone.
 Phthalylhydrazide.
iso-Phthalylhydrazide.
 α -Pinonic acid, hydrazone of.
 5-*iso*-Propylheptan-2-onoic acid,
 phenylhydrazone.
 Pyrazolonephenylhydrazone and
p-tolylhydrazone.
 Pyridineacetonephenylhydrazone.
 Quinonemonophenylbenzoylhydra-
 zone.
iso-Rhammonic acid phenylhydra-
 zide.
 Rhamnose, ethyl-, amyl-, allyl-,
 benzyl-, and naphthyl-hydra-
 zones of.
iso-Rhamnosephenylhydrazone.
 Sulphohydrazimethylenecarboxylic
 acid.
 Terephthalylhydrazidacetoacetic
 acid.
 Terephthalylhydrazide.
p-Tolylglyoxylic acid hydrazone.
 Tropinonephenylhydrazone.
 Veratraldehydhydrazone.
 Veratroylglyoxylic acid hydrazone.

Azo-compounds. See :—

Xylose, ethyl-, amyl-, allyl-,
 benzyl-, and naphthyl-hydra-
 zones of.
 Semicarbazides or semicarbazones :—
 Diphenylsemicarbazide.
 Diphenylthiosemicarbazide.
d- and *l*-Menthonesemicarbazones.
 Phenylacetonylsemicarbazide.
 Phenylacetylsemicarbazide.
 Phenylbenzoylsemicarbazide.
 Phenylcarboxyethylsemithiocarb-
 azide.
 Phenylsemicarbazides.
 Phenylsemicarbazidecarboxylic
 acid.
 Phenylthiocarbazinic acid bisulph-
 ide.
 Phenylthiosemicarbazide.
 5-*iso*-Propylheptan-2-onoic acid
 semicarbazone.
 Terpenone, $C_{10}H_{16}O$, semicarbazone
 of.
 Thiosemicarbazides and thiocarb-
 azides, nomenclature of.
 Azurilic acid, $C_4H_5N_3O_3$ (FISCHER), A.,
 i, 142.

B.

Bacillus, ropiness of beer caused by
 (BROWN and MORRIS), A., ii, 321.
amylobacter, compound nature of
 (OMELIANSKI), A., ii, 203.
 cholera, growth of, in sunlight
 (WESBROOK), A., ii, 265.
fluorescens liquefaciens, inversion of
 cane-sugar by (FERMI and MONTE-
 SANO), A., ii, 493.
megaterium, inversion of cane-sugar
 by (FERMI and MONTESANO), A.,
 ii, 493.
subtilis, action of, on beer (BROWN),
 A., ii, 321.
 Bacteria nodule, action of lime on
 (TACKE), A., ii, 439.
 of the soil and nitrogen assimilation
 (STOKLASA), A., ii, 207.
 which produce ammonia, action of
 phosphoric acid on (BURRI, HER-
 FELDT, and STUTZER), A., ii, 445.
 Bacteriolysis, or first stage of fermenta-
 tion of certain organic substances
 (ADENEX), A., ii, 326.
 Bacterium producing mannitol fermenta-
 tion (BASILE), A., ii, 121.
 Balance, an auxiliary assay (LAW), T.,
 526 ; P., 1896, 75.
 Mohr's, modification of (GUGLIELMO),
 A., ii, 244.
 Balance-sheet of the Chemical Society,
 March 21st, 1896, T., 572.

- Balance-sheet of the Research Fund, March 21st, 1896, T., 573.
- Balsam acajou, cantharidin-like effects of (SPIEGEL and DOBRIN), A., i, 654.
- Mecca, resins contained in (BAUR), A., i, 58.
- Balsams. See also :—
Copaiba, Gurjun, and Tolu balsams.
- Balsamodendron Kafal*, opoponax from (BAUR), A., i, 57.
- Baptisia Australis*, cytisine in (PLUGGE), A., i, 61, 68.
- tinctoria*, cytisine in (PLUGGE), A., i, 61, 67.
- Baptitoxine, identity of cytisine with (PLUGGE), A., i, 67.
- Barium in rocks (HILLEBRAND), A., ii, 191.
- injurious action of, on plants (HASELHOFF), A., ii, 267.
- barium salts, influence of, on blood coagulation (HORNE), A., ii, 437.
- bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.
- oxybromide, thermochemical data of (TASSILLY), A., ii, 465.
- chlorate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- chloride, freezing points of solutions of (LOOMIS), A., ii, 352; (PONSOT), A., ii, 412.
- dissociation pressure of hydrated (MÜLLER-ERZBACH), A., ii, 295.
- oxychloride, thermochemical data of (TASSILLY), A., ii, 465.
- tetrachromite (DUFAY), A., ii, 524.
- ferrate (ROSELL), A., ii, 175; (MOESER), A., ii, 250.
- ferrite (MOESER), A., ii, 250.
- imidosulphonates (DIVERS and HAGA), T., 1622; P., 1896, 179.
- periodate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
- iodomolybdate (CHRÉTIEN), A., ii, 651.
- niobate (LARSSON), A., ii, 564.
- oxide, action of dry hydrogen chloride on (VELEY), A., ii, 360.
- sulphate, solubility of (FRESENIUS and HINTZ), A., ii, 499; (KÜSTER), A., ii, 625.
- precipitation of, by barium chloride (LUNGE), A., ii, 672.
- detection and estimation of, in presence of silicates (DE KONINGH), A., ii, 275.
- Barium metatungstate, physical properties of (SOBOLEFF), A., ii, 478.
- phosphododecatungstate, physical properties of (SOBOLEFF), A., ii, 477.
- tungstitartrate (HENDERSON and BARR), T., 1457; P., 1896, 169.
- Barium, detection of traces of, in strontium salts (SÖRENSEN), A., ii, 362.
- detection of, microchemically (TRAUBE), A., ii, 578.
- estimation of, by alkalis, volumetrically (RUOSS), A., ii, 500.
- separation of calcium and strontium from (DUPASQUIER), A., ii, 450.
- Barklyite from N.S. Wales (LIVERSIDGE), A., ii, 657.
- Barley, protection of diastase by the colouring matter of (GREEN), A., i, 110.
- changes during germination of (EHRICH), A., ii, 541.
- effect of chemical substances on germination of seeds of (SIGMUND), A., ii, 441.
- proteids of (OSBORNE), A., i, 455.
- Barley. See also Agricultural Chemistry (Appendix).
- Barley-meal, proteids from (KJELDAHL), A., i, 583.
- Basalt from Bondi, N.S.W. (CURRAN), A., ii, 40.
- from East Lothian (HATCH), A., ii, 116.
- leucite, from Vesuvius (THORPE), A., ii, 41.
- Base, $C_6H_9N_3O_2$, from albumin salts (HEDIN), A., i, 659.
- $C_9H_{19}NO$, from reduction of camphorone-oxime oxalate (KERP), A., i, 448.
- $C_9H_{16}N$, from reduction of isophorone-oxime, and its oxalate, and carbamide (KERP), A., i, 448.
- $C_{10}H_{11}N_3$, from phenylisobutylidenhydrazine, and its zinc chloride compound, picrate, and bromoderivative (BRUNNER), A., i, 169.
- $C_{12}H_{19}N$, from camphoroxime and its salts (FORSTER), P., 1896, 146.
- Bases, $C_{12}H_{17}ON$, isomeric, from 1:3:4-xylidine and acetaldehyde, and their benzoyl derivatives, oximes, and aniline, anisidine, and 1:3:4-xylidine compounds (MILLER and PLÖCHL), A., i, 534.
- inorganic, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

Bauxite from Alabama (HILLEBRAND), A., ii, 40.
 Bauxites, composition of (LAUR), A., ii, 430.
 Bean, dye of blue (WEIGERT), A., i, 388.
 Beans. See Agricultural Chemistry.
 Beaumontite from Sweden (HOLST), A., ii, 312.
Bebeerinum, preparation of bebirine from (SCHOLTZ), A., i, 710.
 Bebirine, preparation of, from "*Bebeerinum purum*" (SCHOLTZ), A., i, 710.
 hydrochloride, methiodide, and acetyl and benzoyl derivatives and oxidation product (SCHOLTZ), A., i, 710.
 Beef-tea, estimation of solids in (DE KONINGH), A., ii, 552.
 Beer, action of *Bacillus subtilis* on (BROWN), A., ii, 321.
 ropiness of, caused by bacteria (BROWN and MORRIS), A., ii, 321.
 the unfermentable reducing residue of (MORRIS), A., ii, 394.
 detection of fluorine in (BRAND), A., ii, 447; (HEFELMANN and MANN), A., ii, 497.
 detection of salicylic acid in (SCHOEPP), A., ii, 227.
 analysis of (MORRIS), A., ii, 394.
 black, polarisation and analysis of (HERON), A., ii, 394.
 estimation of dry substance in (ELION), A., ii, 395.
 estimation of glycerol in (LABORDE), A., ii, 77; (PARTHEIL), A., ii, 78.
 estimation of maltodextrins in (MORRIS), A., ii, 394.
 Beer-worts, removal of nitrogenous matter from malt and (EHRICH), A., ii, 540.
 polarisation and analysis of (HERON), A., ii, 394.
 estimation of dry substance in (ELION), A., ii, 395.
 estimation of proteids in (SCHJERNING), A., ii, 631.
 Beeswax. See Wax.
 Beetroot, composition of pollen of flowers of (STIFT), A., ii, 541.
 red dyes of (WEIGERT), A., i, 388.
 See Agricultural Chemistry (Appendix) and Sugars.
 Behenoxylic acid, constitution of (SPIECKERMANN), A., i, 410.
 Benzaldehyde, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1091, 1125, 1199, 1242.
 from the electrolysis of potassium mandelate (WALKER), T., 1279.
 reduction of (KAUFFMANN), A., i, 649.

Benzaldehyde, action of ethylic orthoformate on (CLAISEN), A., i, 464.
 action of, on hydrocotarnine (LIEBERMANN), A., i, 711.
 condensation of, with acetophenone (VON KOSTANECKI and ROSSBACH), A., i, 556.
 condensation of, with adipinketon (VORLÄNDER and HOBOM), A., i, 603.
 condensation of, with *o*-aminobenzyl-*p*-toluidine, *o*-aminobenzyl-*o*-toluidine, *o*-aminobenzyl-*o*-anisidine (BUSCH), A., i, 507.
 condensation of, with azobenzene (BARSILOWSKY), A., i, 358.
 condensation of, with cyclohexanone and with isobutylic acetonedicarboxylate (PETRENKO-KRITSCHENKO and ARZIBASCHEFF), A., i, 671.
 condensation of, with *o*-hydroxyacetophenone (FRIEDLÄNDER and RÜDT), A., i, 439.
 condensation of, with *o*-nitroacetophenone (ENGLER and DORANT), A., i, 49.
 condensation of, with thiophen (TÖHL and NARKE), A., i, 690.
 condensation of, with *p*-tolyl methyl ketone (KOSTANECKI and ROSSBACH), A., i, 688.
 lithium hydrogen sulphite (FAGARD), A., i, 39.
 Benzaldehyde, *o*- and *m*-, chloro-, preparation of (GNEHM and BÄNZIGER), A., i, 432.
 3 : 4-dichloro-, preparation of (GNEHM and BÄNZIGER), A., i, 432.
 2 : 5-dichloro-, preparation of (GNEHM and BÄNZIGER), A., i, 432.
 aniline, methylamine, and *p*-phenetidine derivatives of (GNEHM and BÄNZIGER), A., i, 432.
 condensation product of, with dimethylaniline (GNEHM and BÄNZIGER), A., i, 432.
 2 : 5-dichloro-6-amino- (GNEHM and BÄNZIGER), A., i, 432.
 2 : 5-dichloro-6-nitro-, and its aniline derivative (GNEHM and BÄNZIGER), A., i, 432.
 substance, free from nitrogen, obtained from, by action of sodium sulphite (GNEHM and BÄNZIGER), A., i, 433.
 2 : 5-dichloro-?-nitro-, and its aniline derivative (GNEHM and BÄNZIGER), A., i, 432.
o-iodo-, and its dichloride (PATTERSON), T., 1006; P., 1896, 153.
m-iodo-, and its dichloride (PATTERSON), T., 1002; P., 1896, 153.

Benzaldehyde, *p*-iodo-, and its dichloride (PATTERSON), T., 1005; P., 1896, 153.

o-iodoso- (PATTERSON), T., 1007; P., 1896, 153.

m-iodoso (PATTERSON), T., 1003; P., 1896, 153.

acetate. See Acetic acid, benzaldehyde, *m*-iodoso, salt of.

p-iodoso- (PATTERSON), T., 1005; P., 1896, 153.

m-iodoxy- (PATTERSON), T., 1004; P., 1896, 153.

p-iodoxy- (PATTERSON), T., 1005; P., 1896, 153.

nitro-, heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.

m-nitro-, condensation of, with *o*-aminobenzylamine, (BUSCH), A., i, 507.

p-nitro-, condensation of, with aniline (PRUD'HOMME), A., i, 307.

Benzaldehydecyanhydrin, hydrolysis of, with alkalis (GLÜCKSMANN), A., i, 39.

condensation of, with benzaldehyde (FISCHER), A., i, 262.

Benzaldehydediphenylhydrazine

(CARSE), A., i, 611.

Benzaldehydephenylhydrazone

(WALKER), T., 1279.

action of formaldehyde on (WALKER), T., 1285.

Benzaldehydephenylhydrazone, 2 : 5-dichloro- (GNEHM and BÄNZIGER), A., i, 432.

2 : 5-dichloro-6-amino- (GNEHM and BÄNZIGER), A., i, 432.

2 : 5-dichloro-6-nitro- (GNEHM and BÄNZIGER), A., i, 432.

2 : 5-dichloro-?-nitro- (GNEHM and BÄNZIGER), A., i, 432.

o-iodo- (PATTERSON), T., 1008; P., 1896, 153.

m-iodo- (PATTERSON), T., 1009; P., 1896, 153.

p-iodo- (PATTERSON), T., 1009; P., 1896, 153.

Benzaldehydine, amino- (HINSBERG and KOLLER), A., i, 537.

Benzaldoxime and its hydrochloride (LUXMOORE), T., 177; P., 1895, 149.

action of phosphorus trichloride on (LUXMOORE), T., 191; P., 1895, 149.

action of phosphorus pentachloride on (LUXMOORE), T., 190; P., 1895, 149.

chloro-derivative of (LUXMOORE), T., 191; P., 1895, 149.

Benzaldoxime sulphates (LUXMOORE), T., 180; P., 1895, 149.

Benzaldoxime, 2 : 5-dichloro-6-amino- (GNEHM and BÄNZIGER), A., i, 432.

2 : 5-dichloro-6-nitro- (GNEHM and BÄNZIGER), A., i, 432.

2 : 5-dichloro-?-nitro (GNEHM and BÄNZIGER), A., i, 432.

o-iodo- (PATTERSON), T., 1008; P., 1896, 153.

m-iodo-, and its dichloride (PATTERSON), T., 1008; P., 1896, 153.

p-iodo- (PATTERSON), T., 1008; P., 1896, 153.

Benzsynaldoxime, preparation of (HANTZSCH and SCHULTZE), A., i, 672.

velocity of formation of benz-*anti*-aldoxime from (LEY), A., ii, 243.

action of phosphorus trichloride on (LUXMOORE), T., 192; P., 1895, 149.

salts of (LUXMOORE), T., 180; P., 1895, 149.

hydrochloride (LUXMOORE), T., 179; P., 1895, 149.

acetate, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.

p-brom, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.

p-chlor, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.

p-iodo, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.

p-iodo, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.

p-chlor, velocity of formation of the *anti*-modification from (LEY), A., ii, 243.

Benzaldoximes, isomerism of alkyl derivatives of (LUXMOORE), T., 187; P., 1895, 149.

methyl derivatives of (LUXMOORE), T., 186.

iso-Benzaldoximido-acetic acid (HANTZSCH and WILD) A., i, 285.

action of halogen acids on (HANTZSCH and WILD), A., i, 286.

its metallic salts and ethylic salt, (HANTZSCH and WILD), A., i, 285.

Benzamide (CURTIUS), A., i, 340.

preparation of (LUXMOORE), T., 188; (BUSCH and STERN), A., i, 677.

magnetic rotatory power, &c., of (PERKIN), T., 1114, 1216, 1246.

heat of solution in ethylic alcohol of (SPEYERS), A., ii, 411.

action of phosphorus trichloride on (LACHMANN), A., i, 601.

decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.

action of sodium ethoxide on (COHEN

- and ARCHDEACON), T., 94; P., 1896, 8.
- Benzamide, acetyl derivative of (BLANCHER), A., i, 33.
- Benzamide, *o*-chloro-, thermochemical data of (RIVALS), A., ii, 410.
- thio-, action of iodine on (HOFMANN LECTURE), T., 714.
- Benzamidine, condensation of, with benzoin (KULISCH), A., i, 627.
- Benzamidoacetamidothymol (SODERI), A., i, 359.
- Benzamidobenzene, chloro- (SLOSSON), A., i, 216.
- o*-Benzamidobenzonitrile (PINNORO and SÄMANN), A., i, 366.
- Benzamidobenzoylthymol (PLANCHER), A., i, 358.
- 2-Benzamidodiphenyl (PICTET and HUBERT), A., i, 53, 483.
- Benzamido-*p*-methylbenzylamide (LUSTIG), A., i, 163.
- 3-Benzamidoquinoline (CLAUS and SCHNELL), A., i, 320.
- p*-Benzamidodisulphonamide (REMSEN and MUCKENFUSS), A., i, 482.
- Benzamidodisulphonamide, infusible (REMSEN and MUCKENFUSS), A., i, 482.
- Benzamidodisulphonic acid, *p*-bromo-, ethylic salt of (BÖTTINGER), A., i, 372.
- 5-Benzamidotetrazole (THIELE and INGLE), A., i, 107.
- Benzamidothymol and its benzoate (PLANCHER), A., i, 358.
- Benzanilide, preparation of (COHEN and ARCHDEACON), T., 92; (BUSCH and STERN), A., i, 677.
- benzoyl derivative of (HALLER), A., i, 33.
- m*-nitro-*o*-amino- (KRATZ), A., i, 365.
- Benzanilamide sodium ethoxide (COHEN and ARCHDEACON), T., 94; P., 1896, 8.
- Benzazide. See Benzoylazoimide.
- Benzene, discovery of (HOFMANN LECTURE), T., 597.
- discovery of, in coal tar (HOFMANN LECTURE), T., 690.
- constitution of (HEYL and MEYER), A., i, 145; (BRÜHL), A., i, 147; (MEYER), A., i, 213; (VAUBEL), A., i, 213, 352, 646; (HANTZSCH), A., i, 419.
- constitution according to the vortex atom, theory of (FITZGERALD), T., 892; P., 1896, 25.
- magnetic rotatory power, &c., of (PERKIN), T., 1064, 1082, 1084, 1085, 1191, 1241.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (GRIFFITHS and MARSHALL), A., ii, 349.
- Benzene, influence of pressure on the freezing points of solutions of substances in (COLSON), A., ii, 157.
- volume changes during the formation of solutions in (JONES), P., 1895, 179.
- derivatives, action of bromine on, and the effect of various groups on the orientation (VAUBEL), A., i, 147.
- α -hexabromide (ORNDORF and HOWELLS), A., i, 474.
- β -hexabromide (ORNDORF and HOWELLS), A., i, 474.
- hexabromide, *cis*- and *trans*-modifications of (ORNDORF and HOWELLS), A., i, 474.
- estimation of, in illuminating gas (NOYES and BLINKS), A., ii, 128.
- separation of, from light petroleum (HENRIQUES), A., ii, 77.
- separation of, from coal-tar naphtha (HOFMANN LECTURE), T., 598.
- Benzene, bromo-, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1118, 1119, 1202, 1243.
- melting point of (v. SCHNEIDER), A., ii, 290.
- action of sodium on (WEILER), A., i, 242.
- condensation of, with ethylic oxalate (FREY), A., i, 99.
- o*-dibromo-, preparation of (BRUYN and VAN LEENT), A., i, 605.
- 1 : 3 : 5-tribromo- (JACKSON and CALVERT), A., i, 473.
- reduction of (JACKSON and CALVERT), A., i, 538.
- action of sodium ethoxide on (JACKSON and CALVERT), A., i, 473.
- 1 : 2 : 3 : 5-tetrabromo- (JACKSON and CALVERT), A., i, 473.
- 1 : 2 : 4 : 5-tetrabromo (JACKSON and CALVERT), A., i, 473.
- 1 : 4-bromiodo-, preparation of (HIRTZ), A., i, 531.
- 1 : 3 : 5 : 2-tribromiodo-, preparation of (JACKSON and CALVERT), A., i, 473.
- insoluble substance formed in the decomposition of (JACKSON and CALVERT), A., i, 473.
- o*-bromonitro-, preparation of (COSTE and PARRY), A., i, 352; (DE CONINCK), A., i, 473; (ULLMANN), A., i, 605.
- m*-bromonitro- (DE CONINCK), A., i, 473.
- p*-bromonitro- (COSTE and PARRY), A., i, 352; (DE CONINCK), A., i, 473.

Benzene, 4 : 1 : 2-bromodinitro- (CURTIUS), A., i, 339.

1 : 3 : 5 : 2 : 4-tribromodinitro- (JACKSON and CALVERT), A., i, 473.

reduction of (JACKSON and CALVERT), A., i, 538.

tribromotrinitro-, action of sodium ethoxide on (JACKSON and CALVERT), A., i, 473.

tetrabromo-*m*-dinitro-, action of sodium ethoxide on (JACKSON and CALVERT), A., i, 473.

chloro-, preparation of, by Sandmeyer's reaction (WALTER), A., i, 472.

magnetic rotatory power, &c., of (PERKIN), T., 1064, 1118, 1202, 1243.

melting point of (v. SCHNEIDER), A., ii, 290.

o-dichloro-, preparation of (BRUYN and VAN LEENT), A., i, 604.

melting point of (DE CONINCK), A., i, 703.

m-dichloro-, preparation of (CHATTAWAY and EVANS), T., 848; P., 1896, 97; (BRUYN and VAN LEENT), A., i, 604.

melting point of (DE CONINCK), A., i, 473.

condensation of with chlorobenzene (CHATTAWAY and EVANS), T., 982; P., 1896, 114.

p-dichloro-, preparation of (BRUYN and VAN LEENT), A., i, 604.

melting point of (DE CONINCK), A., i, 473.

magnetic rotatory power, &c., of (PERKIN), T., 1120, 1202, 1243.

influence of pressure on the freezing point of a benzene solution of (COLSON), A., ii, 157.

1 : 3 : 5-trichloro-, preparation of (BRUYN and VAN LEENT), A., i, 604, 605.

tetrachloro- (GNEHM and BÄNZIGER), A., i, 432.

1 : 2 : 4 : 6-tetrachloro- (ZAHARIA), A., i, 646.

1 : 2 : 3 : 5-tetrachloro-, preparation of (BRUYN and VAN LEENT), A., i, 604.

pentachloro-, preparation of (ZAHARIA), A., i, 646.

hexachloro-, preparation of (ZAHARIA), A., i, 646.

2 : 1 : 3 : 5-chlorotribromo- (JACKSON and CALVERT), A., i, 473.

p-chlorocyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.

chloro-*p*-iodo-, from *p*-chlorodiaz-

benzene anhydride (BAMBERGER), A., i, 299.

Benzene, *p*-chloriodoxy-, preparation of (WILLGERODT), A., i, 533.

o-chloronitro-, preparation of (ULLMANN), A., i, 605.

melting point of (DE CONINCK), A., i, 473.

m-chloronitro-, melting point of (DE CONINCK), A., i, 473.

p-chloronitro-, melting point of (DE CONINCK), A., i, 473.

action of hydrochloric acid on (BRUYN and VAN LEENT), A., i, 604.

condensation of, with benzylamine (KEHRMANN and TIKHVINSKY), A., i, 511.

p-chlorothiocyano- (HANTZSCH and HIRSCH), A., i, 429.

fluoro-, magnetic rotatory power, &c., of (PERKIN), T., 1118, 1119, 1162, 1201, 1243.

iodo-, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1118, 1119, 1203, 1243.

melting point of (v. SCHNEIDER), A., ii, 290.

hexiodo- (RUPP), A., i, 618.

o-iodonitro-, preparation of (ULLMANN), A., i, 605.

iodoxy-, preparation of (WILLGERODT), A., i, 533.

action of barium hydroxide on (WILLGERODT), A., i, 676.

nitro-, preparation of (HOFMANN LECTURE), T., 607.

magnetic rotatory power, &c., of (PERKIN), T., 1064, 1094, 1180, 1239.

behaviour of, towards hydroxylamine (ANGELI), A., i, 613.

reduction of (WISLICENUS), A., i, 298, 672; (LÖB), A., i, 533, 605.

metabolism in, poisoning by (MÜNZER and PALMA), A., ii, 662.

o-dinitro-, action of hydrochloric and hydrobromic acids on (BRUYN and VAN LEENT), A., i, 604, 605.

m-dinitro-, magnetic rotatory power, &c., of (PERKIN), T., 1095, 1181, 1239.

heat of combination with naphthalene in the liquid and solid states (PICKERING), A., ii, 148.

influence of pressure on the freezing point of a benzene solution of (COLSON), A., ii, 157.

reduction of (HOFMANN LECTURE), T., 647.

action of hydrochloric acid on

- (BRUYN and VAN LEENT), A., i, 604.
- Benzene, *p*-dinitro-, action of hydrochloric acid on (BRUYN and VAN LEENT), A., i, 604.
- 1 : 3 : 5-trinitro- (HILL and TORRAY), A., i, 90.
- action of hydrochloric acid on (BRUYN and VAN LEENT), A., i, 604.
- action of soda on (MEYER), A., i, 419.
- compound of, with potassium methoxide (MEYER), A., i, 419; (BRUYN and VAN LEENT), A., i, 147.
- nitroso-, preparation of (PILOTY), A., i, 556.
- behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.
- o*-dinitroso- (ZINCKE), A., i, 430.
- Benzeneazimidole, reduction and oxidation of (ZINCKE), A., i, 429.
- Benzene-4-azo-2-acetamidophenol, *m*-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1324.
- Benzene-4-azo-2-aminophenol, *m*-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1325.
- Benzeneazo-*o*-cresetol, reduction of (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 23.
- Benzeneazo-*m*-cresetol, reduction of (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- Benzeneazocyanacetic acid, propylic, butylic, and amylic salts, modifications of (FAVREL), A., i, 479.
- Benzeneazoethane, conversion into acet-aldehydephenylhydrazone (FISCHER), A., i, 361.
- Benzeneazoguaiacol, *m*-nitro-, and its benzoate [$\text{OH} : \text{OMe} : \text{N}_2 = 1 : 2 : 4$] (MELDOLA, WOOLCOTT, and WRAY), T., 1333.
- Benzeneazoimidoformyl cyanide (NEF), A., i, 73.
- Benzeneazophenetoil, derivatives of, reduction of (JACOBSEN), A., i, 23.
- Benzencazoresorcinoloxime, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
- Benzeneazosalicylic acid, potassium, ethylic salts (HEWITT and STEVENSON), T., 1265; P., 1896, 150.
- o*-chloro-, ammonium, potassium, silver, methylic, ethylic salts, behaviour towards bases (HEWITT and STEVENSON), T., 1258; P., 1896, 149.
- m*-chloro-, ammonium, silver, barium, potassium, methylic, ethylic salts (HEWITT and STEVENSON), T., 1262; P., 1896, 150.
- Benzeneazosalicylic acid, *p*-chloro-, potassium, ammonium, barium, silver, methylic, ethylic salts (HEWITT and STEVENSON), T., 1263; P., 1896, 150.
- Benzeneazoximidoresorcinol, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
- Benzenediazonium chloromiodide, chlorodiodide, dichloriodide, bromodiodide, dibromiodide, chlorodibromide, and bromodichloride (HANTZSCH), A., i, 93.
- thiocyanate (HANTZSCH and HIRSCH), A., i, 428.
- Benzenediazonium, *p*-bromo-, bromodiodide, dibromiodide, and chlorobromiodide (HANTZSCH), A., i, 94.
- tribromo*-, thiocyanate (HANTZSCH and HIRSCH), A., i, 429.
- p*-chloro-, chloride and thiocyanate (HANTZSCH and HIRSCH), A., i, 428, 429.
- p*-nitro-, perbromide, from *anti-p*-nitrodiazobenzenethiophenyl ether (HANTZSCH and FREESE), A., i, 218.
- dichloriodide, and chlorobromiodide (HANTZSCH), A., i, 94.
- p*-thiocyano-, chloride (HANTZSCH and HIRSCH), A., i, 429.
- Benzenediazosulphonic acid, potassium salt (BAMBERGER and KRAUS), A., i, 611.
- Benzene-6 : 1-diazoxide, 2 : 4-bromo-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1327; P., 1896, 164.
- 4-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1328.
- Benzene-*o*-dicarboxylic chloride. See Phthalic chloride.
- Benzene-*o*-dioxime. See *o*-Quinonedioxime.
- Benzene-*m*-disulphonic acid, calcium salt of (SNAPE), T., 100.
- Benzene-*p*-disulphonic acid, calcium salt of (SNAPE), T., 100.
- Benzeneindone. See Aposafrafranine and also Anilidoaposafranine.
- Benzeneindonehydrate. See Hydroxyaposafranine.
- Benzenesulphinic acid, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- sodium salt of, action of stilbene dibromide, and α - and β -tolane dibromide on (OTTO), A., i, 242.
- Benzenesulphonamide, diacetyl derivative of (PILOTY), A., i, 556.

- Benzenesulphonamide, *dibromo*- (KASTLE, KEISER, and BRADLEY), A., i, 555.
p-bromocyano- (KREIS), A., i, 48.
p-chloro-, *dibromide* (KASTLE), A., i, 172.
dichloro- (KASTLE, KEISER, and BRADLEY), A., i, 555.
p-chloro*dibromo*- (KASTLE, KEISER, and BRADLEY), A., i, 555.
dichloro-p-bromo- (KASTLE, KEISER, and BRADLEY), A., i, 555.
p-cyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- Benzenesulphoncasparagine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Benzenesulphonebenzylhydroxylamine (PILOTY), A., i, 556.
- Benzenesulphoneglycocine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Benzenesulphonephenylhydroxylamide (PILOTY), A., i, 556.
- Benzenesulphonepiperidide (FRANCHIMONT and TAVERNE), A., i, 603.
- Benzenesulphonic acid, diamo- (ZINCKE), A., i, 169.
 5 : 2-bromocyano-, and salts (KREIS), A., i, 48.
p-cyano-, and salts (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
p-nitrosophenylic salt (BÖRNSTEIN), A., i, 542.
- Benzenesulphonic chloride, magnetic rotatory power, &c., of (PERKIN), T., 1123, 1205, 1244.
 condensation of, with piperazine (ROSDALSKY), A., i, 257.
 5 : 2-bromocyano- (KREIS), A., i, 48.
p-cyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 372.
- Benzenesulphonic methylamide, action of nitric acid on (FRANCHIMONT), A., i, 602.
- Benzenesulphonylhydroxylamide, its salts and diacetyl derivative (PILOTY), A., i, 555.
- Benzenesulpho-*o*-toluidide, *p*-cyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- Benzenesulpho-*m*-toluidide, *p*-cyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- Benzenesulpho-*p*-toluidide, *p*-cyano- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- Benzenyl-*o*-aminothiophenol, preparation of (HOFMANN LECTURE), T., 712.
- Benzenylaminoxime, ethylenic ether (WERNER and GEMESEUS), A., i, 431.
- Benzenylaminoxime, *o*-amino-, and its salts (PINNOW and SÄMANN), A., i, 366.
dibromo-, ethylenic ether (WERNER and GEMESEUS), A., i, 431.
dichloro-, ethylenic ether (WERNER and GEMESEUS), A., i, 431.
- Benzenylazoximethenyl, *o*-amino-, and its hydrochloride and acetyl derivative (PINNOW and SÄMANN), A., i, 367.
- Benzerythrene. See *p*-Bidiphenyl.
- Benzethylamide, *m*-nitro-*o*-amino- (KRATZ), A., i, 365.
- Benzethyleneamide, *m*-nitro-*o*-amino- (KRATZ), A., i, 365.
- Benzhydrazide, action of diazobenzene on (CURTIUS), A., i, 339.
m-amino-, its hydrochloride and benzylidene derivative (STRUVE and RADENHAUSEN), A., i, 36.
o-bromo- (STRUVE and RADENHAUSEN), A., i, 36.
m-nitro-*o*-amino- (KRATZ), A., i, 365.
- Benzhydrol, *o*-amino-, and its acetyl derivative (GABRIEL and STELZNER), A., i, 506.
- Benzhydrol ether, preparation of (KLINGER and LONNES), A., i, 686.
- Benzidam. See Aniline.
- Benzidine, preparation of (LÖB), A., i, 605.
 estimation of (VAUBEL), A., ii, 507.
- Benzil, refraction equivalent of (ANDERLINI), A., ii, 229.
 condensation of, with acetonedicarboxylic acid (JAPP and LANDER), P., 1896, 109.
 condensation of, with ethylic acetate (JAPP and LANDER), T., 736; P., 1895, 146.
 condensation of, with levulinic acid (JAPP and MURRAY), P., 1896, 146.
 condensation of, with phenylethylenediamine (FEIST and ARNSTEIN), A., i, 258.
 condensation of, with thiophenol (TROEGER and EGGERT), A., i, 562.
- Benzilic acid (*diphenylglycollic acid*), action of sulphuric acid on (KLINGER and LONNES), A., i, 374.
- Benzimidoeethyl ether (BUSCHONG), A., i, 546.
- Benzimidomethyl ether (BUSCHONG), A., i, 546.
- Benzo- α -hydroxy- $\alpha\beta$ -diphenylethylamine (SÖDERBAUM), A., i, 484.
- Benzobiuret (OSTROGOVITCH), A., i, 530.
- Benzobutylamide, γ -chloro- (LICHMANN), A., i, 545.

- Benzocyanethenylamidoxime (SCHMIDT-MANN), A., i, 458.
 Benzo-4-chloro-1 : 3 : 5-xylencamide (KLAGES), A., i, 291.
 Benzodibenzylhydrazide (CURTIUS and QUEDENFELDT), A., i, 29.
 Benzo-2 : 4-dichloranilide (WHEELER and BOLTWOOD), A., i, 478.
 Benzodichloro-1 : 3 : 5-xyleneamide (KLAGES), A., i, 291.
 Benzodiethylthiourea (DIXON), T., 1604; P., 1896, 224.
 Benzoformanilide (WHEELER and BOLTWOOD), A., i, 478.
 Benzoformo-2 : 4-dichloranilide (WHEELER and BOLTWOOD), A., i, 478.
 Benzoform-*o*-tolnidide (WHEELER and BOLTWOOD), A., i, 478.
 Benzoic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
 influence of pressure on the freezing point of a benzene solution of (COLSON), A., ii, 157.
 absorption by silk of dilute (WALKER and APPELYARD), T., 1346; P., 1896, 147.
 Benzoic acid, alkali salts of, estimation of (REBIÈRE), A., ii, 396.
 ammonium salt and thermochemical data of the amide of (RIVALS), A., ii, 410.
 anthraflavic acid salt of (HOFMANN LECTURE), T., 633.
 allylic, butylic, *iso*-butylic, ethylic, methylic, octylic, propylic, and *iso*-propylic salts of, magnetic rotatory powers, &c., of the (PERKIN), T., 1073-1078, 1094, 1125, 1141, 1173-1175, 1226, 1237, 1238, 1247.
 amylic and ethylic salts, molecular volumes in organic solvents of, the (NICOL), T., 1413; P., 1895, 237.
 5-bromo-2-hydroxybenzylidene-acetone salt of, (KOSTANECKI and SCHNEIDER), A., i, 614.
 2-chloro-4-nitrophenol salt of (MELDOLA, WOOLCOTT, and WRAY), T., 1328; P., 1896, 164.
 2-chloro-5-nitro-phenol salt of (MELDOLA, WOOLCOTT, and WRAY), T., 1326; P., 1896, 163.
 4-chloro-3-nitrophenol salt of (MELDOLA, WOOLCOTT, and WRAY), T., 1323; P., 1896, 163.
 guaiacol salt of (MELDOLA), P., 1896, 126, 127; (BRÜGGEMANN), A., i, 356.
 detection of (DRAGENDORFF), A., ii, 278.
 hydroxymethylenephnylacetic acid, salt of (WISLICENUS), A., i, 553.
 Benzoic acid, β -naphthyllic salt of, detection of (DRAGENDORFF), A., ii, 279.
 nitramino-thymylic salt of (SODERI), A., i, 359.
 m-nitro-benzeneazoguaiacol salt of, (MELDOLA, WOOLCOTT, and WRAY), T., 1333.
 o-nitroguaiacol salt of, [OBz : OME : NO₂ = 1 : 2 : 6] (MELDOLA), P., 1896, 127.
 p-nitroguaiacol salt of, [OBz : OME : NO₂ = 1 : 2 : 4] (MELDOLA), P., 1896, 127.
 phenylhydroxystyrylketone salt of (HARRIES and RUSSE), A., i, 302.
 tolyllic salts, detection of (DRAGENDORFF), A., ii, 280.
 Benzoic acid, *o*-amino-. See Anthranilic acid.
 m-amino-, action of chloroform and potash on (ELLIOTT), T., 1513; P., 1896, 171.
 action of sodium hypochlorite on (DE CONINCK), A., i, 364.
 condensation of with glyoxylic acid (BOETTINGER), A., i, 47.
 p-amino-, decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
 condensation of, with glyoxylic acid (BOETTINGER), A., i, 47.
 2 : 5-diamino-, ethylic salt of, and its hydrochloride and sulphate (HAEUSERMANN and ZEICHMANN), A., i, 170.
 p-bromo-, ethylic salt of (BÖTTINGER), A., i, 372.
 p-bromo-*o*-iododichloride (HIRTZ), A., i, 532.
 4 : 3 : 5-bromodinitro- (JACKSON and ITTNER), A., i, 214.
 o-chloro-, and its potassium and ammonium salts, thermochemical data of (RIVALS), A., ii, 409.
 o-chloro-*o*-nitro- (VAN LOON and MEYER), A., i, 434.
 o-fluoro-*o*-nitro- (VAN LOON and MEYER), A., i, 434.
 o-iodo- (PATTERSON), T., 1007.
 action of bromine on (HIRTZ), A., i, 532.
 m-iodo- (PATTERSON) T., 1003.
 action of bromine on (HIRTZ), A., i, 532.
 p-iodo-, action of bromine on (HIRTZ), A., i, 531.
 o-iodoso-, sodium salt of, preparation of (HIRTZ), A., i, 532.
 o-nitro, heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.

- Benzoic acid, *o*-nitro-, freezing points of dilute solutions of (WILDERMANN), A., ii, 351.
 reduction of (LÖB), A., i, 533.
m-nitro, heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.
p-nitro, heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.
 dinitro-derivatives of (VAUBEL), A., i, 646.
 2 : 3-dinitro-, and its barium salt (GRELL), A., i, 95.
 2 : 4 : 6-trinitro- (MEYER), A., i, 434.
 action of hydrochloric acid on (BRUYN and VAN LEENT), A., i, 605.
 action of soda on (MEYER), A., i, 419.
 potassium methoxide, derivative of (LEENT), A., i, 614.
 new acid obtained by action of caustic potash on, and its salts (LEENT), A., i, 615.
 etherification of (MEYER), A., i, 547.
 4 : 3-nitramino- (ZINCKE and HELMERT), A., i, 548.
o-nitroso- (FISCHER), A., i, 696.
 thio-, ammonium salt of (BUSCH and STERN), A., i, 677.
 thionamide (SCHENCK), A., i, 427.
 dithio- (SCHENCK), A., i, 427.
 Benzoic anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.
 Benzoic chloride, magnetic rotatory power, &c., of (PERKIN), T., 1121, 1205, 1244.
 action of lead thiocyanate on (DIXON), T., 1603.
o-chloro-, thermochemical data of (RIVALS), A., ii, 409.
 Benzoic cyanide, thermochemical data of (GUINCHANT), A., ii, 465.
 trimolecular (NEF), A., i, 74.
 Benzoic fluoride (MESLANS and GIRARDET), A., i, 346.
 Benzoic peroxide and action of phenylhydrazine on (VANINO and THIELE), A., i, 597.
 Benzoic bisulphide, action of alcoholic ammonia on (BUSCH and STERN), A., i, 677.
 Benzoic sulphinide (KREIS), A., i, 49.
 acetyl derivative of (ECKENROTH and KOERPPEN), A., i, 438.
p-bromo- (KREIS), A., i, 48.
 Benzo- β -iodethylamide (GABRIEL and STELZNER), A., i, 121.
 Benzoin, condensation of, with benzamidine (KULISCH), A., i, 627.
 Benzoindicarboxylic acid, diamino-, and its osazone (ELLIOTT), T., 1517; P., 1896, 171.
 Benzoinoxime, reduction of (ERLENMEYER), A., i, 305.
 Benzoinethylamide, *m*-nitramino- (KRATZ), A., i, 365.
 Benzomethylamide, nitro-, action of nitric acid on (FRANCHIMONT), A., i, 602.
 Benzomethylisoamylamide. See Methylisoamylamine, benzoyl derivative.
 Benzo-*p*-methylbenzylamide (LUSTIG), A., i, 163.
 Benzomethylisobutylamide. See Methylisobutylamine, benzoyl derivative.
 Benzonitrile (LACHMANN), A., i, 601.
 preparation of (LUXMOORE), T., 189; (HOFMANN LECTURE), T., 705.
 from magnesium nitride and benzoic anhydride (EMMERLING), A., i, 591.
 synthesis of (DESGREZ), A., i, 419.
 magnetic rotatory power, &c., of (PERKIN), T., 1096, 1206, 1244.
 melting point of (v. SCHNEIDER), A., ii, 290.
 Benzonitrile, amino-, acetyl and benzoyl derivatives of (PINNOW and SÄMANN), A., i, 366.
 nitro-, reduction of (HOFMANN LECTURE), T., 709.
 Benzo-*m*-nitro-*p*-methylbenzylamide (LUSTIG), A., i, 163.
 Benzophenone, preparation of (COMSTOCK), A., i, 613; (KONOWALOFF), A., i, 675.
 magnetic rotatory power, &c., of (PERKIN), T., 1064, 1091, 1093, 1201, 1243.
 action of zinc dust on (LOHSE), A., i, 619.
 action of ethylic orthoformate on (CLAISEN), A., i, 464.
o amino- (GRAEBE and ULLMANN), A., i, 556.
 Benzophenone-oxime, preparation of (KONOWALOFF), A., i, 675.
o-amino-, acetyl derivative of (AUWERS and EWING), A., i, 504.
 Benzophenylethylenediamine (GABRIEL and STELZNER), A., i, 121.
 Benzophenylhydrazide (VANINO and THIELE), A., i, 597.
 Benzophenylbenzylidenhydrazone (WALTHER), A., i, 543.
 Benzophenyl-*o*-nitrobenzylidenhydrazone (WALTHER), A., i, 542.
 Benzophenyl-*m*-nitrobenzylidenhydrazone (WALTHER), A., i, 542.

- Benzophenyl-*p*-nitrobenzylidenhydrone (WALTHER), A., i, 542.
- α -Benzophenylsemicarbazide (WIDMAN), A., i, 630.
- Benzophenylpropylenediamine (GABRIEL and STELZNER), A., i, 121.
- Benzopinacolines, α - and β - (LOHSE), A., i, 620; (KLINGER and LONNES), A., i, 687.
- Benzoquinone. See Quinone.
- Benzosol. See Benzoic acid, guaiacol salt of.
- Benzothiazolecarboxylic acid, preparation of (HOFMANN LECTURE), T., 713.
- Benzothiocarbimide, and the action of diethylamine on (DIXON), T., 1603; P., 1896, 224.
- Benzo-*m*-toluamide, *m*-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Benzoveratrylamide (MOUREU), A., i, 426.
- Benzovinylamide (GABRIEL and STELZNER), A., 121.
- 2-Benzoxybenzylidenacetone, 5-bromo-. See Benzoic acid, 2-hydroxybenzylidenacetone salt of, 5-bromo-.
- Benzoxy-3 : 2-diethylaminotetrahydronaphthalene and its picrate (BAMBERGER and LODTER), A., i, 99.
- Benzoxy-3 : 2-dimethylaminotetrahydronaphthalene (BAMBERGER and LODTER), A., i, 99.
- 3 : 1 : 5-Benzoxyphenylisobutyltriazole (WIDMAN), A., i, 630.
- Benzoyl groups, estimation of (MEYER), A., ii, 226.
- Benzoylacethydroxamic acid (NEF and JONES), A., i, 460.
- Benzoylacetic acid, action of ethylic orthoformate on (CLAISEN), A., i, 464.
- ethylic salt, magnetic rotatory power, &c. (PERKIN), T., 1064, 1178, 1238.
- ammonia additive product of (GOLDSCHMIDT), A., i, 231.
- condensation of, with *o*-ethylic chlorofumarate (RUHEMANN and WOLFF), T., 1384; P., 1896, 166.
- Benzoylacetylmethane. See Dibenzoylacetylmethane.
- Benzoylalanine, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- Benzoylallophanic acid, ethylic salt of (VON PECHMANN and VANINO), A., i, 33.
- action of ammonia on (OSTROGOVICH), A., i, 530.
- Benzoylammoresinotannol (LUZ), A., i, 249.
- Benzoylazoimide (CURTIUS), A., i, 34, 340.
- m*-amino- (STRUVE and RADENHAUSEN), A., i, 36.
- o*-nitro- (STRUVE and RADENHAUSEN), A., i, 35.
- m*-nitro- (STRUVE and RADENHAUSEN), A., i, 35.
- and its salts (KRATZ), A., i, 364, 365.
- p*-nitro- (STRUVE and RADENHAUSEN), A., i, 35.
- Benzoylbebirine, formation and properties of (SCHOLTZ), A., i, 710.
- p*-Benzoylbenzamide, *m*-nitro- (LIMPRICHT and LENZ), A., i, 41.
- Benzoylbenzanilide (HALLER), A., i, 33.
- Benzoylbenzoic acid (HALLER), A., i, 32.
- behaviour towards phenylic isocyanate of (HALLER), A., i, 32.
- p*-Benzoylbenzoic acid, *m*-amino-, and salts (LIMPRICHT and LENZ), A., i, 41.
- p*-amino- (LIMPRICHT and SAMIETZ), A., i, 42.
- m*-nitro, and salts (LIMPRICHT and LENZ), A., i, 41.
- p*-nitro-, and its salts (LIMPRICHT and SAMIETZ), A., i, 42.
- p* Benzoylbenzoic chloride, *m*-nitro- (LIMPRICHT and LENZ), A., i, 41.
- p*-nitro- (LIMPRICHT and SAMIETZ), A., i, 42.
- p*-Benzoyl-*p*-benzoylbenzoic acid, *m*-nitro- (LIMPRICHT and LENZ), A., i, 42.
- p*-nitro-, and sodium salt (LIMPRICHT and SAMIETZ), A., i, 42.
- Benzoylbenzyl methyl ketone, oxime of (KOLB), A., i, 577.
- β -Benzoyl- α -benzylpropionic acid, α -cyanomethylic salt (KLOBB), A., i, 126.
- Benzoyl-*p*-bromobenzoylacetylmethane and its copper derivative (CLAISEN and FALK), A., i, 558.
- Benzoylcannabinol (WOOD, SPIVEY, and EASTERFIELD), T., 545; P., 1896, 76.
- Benzoylcarbazole, tribromo- (MAZZARA and LEONARDI), A., i, 393.
- chlorobromo- (LAMBERTI-ZANARDI), A., i, 304.
- α -dichlorodibromo- (LAMBERTI-ZANARDI), A., i, 305.
- β -dichlorodibromo- (LAMBERTI-ZANARDI), A., i, 305.
- chloronitro- (LAMBERTI-ZANARDI), A., i, 651.
- Benzoylchironol (BAUR), A., i, 57.

- β*-Benzoylcinnamic acid. See Desyleneacetic acid.
- α*-Benzoylcoumarone (RAP), A., i, 303.
substance derived from, by the action of hydroxylamine (RAP), A., i, 303.
- α*-Benzoylcoumaronehydrazone (RAP), A., i, 303.
- α*-Benzoylcoumarone-oxime (RAP), A., i, 303.
- Benzoyldiacetylmethane: benzoate of its anilide (CLAISEN and FALK), A., i, 559.
- Benzoyldiduroquinone (RÜGHEIMER and HANKEL), A., i, 688.
- Benzoyl-*α*-ecgonine, formation of (WILLSTÄTTER), A., i, 708.
- p*-Benzoyl-*o*-ethoxybenzoic acid and its ethylic salt (LIMPRICHT), A., i, 435.
- Benzoylethylnitrolic acid (NEF and JONES), A., i, 460.
- β*-Benzoyl-*α*-ethylpropionic acid, *α*-cyanoethylic salt (KLOBB), A., i, 126.
- β*-Benzoylglutaric acid, preparation of (EMERY), A., i, 436.
- Benzoylglyceric acid, active, rotatory power of the methylic and ethylic salts of (FRANKLAND and MACGREGOR), T., 112; P., 1896, 10.
- Benzoylglyceric acid, inactive, methylic salt of (FRANKLAND and MACGREGOR), T., 113; P., 1896, 10.
- Benzoylglyceric-*β*-naphthalide (GASSMANN), A., i, 488.
- Benzoylglycollic-*α*-naphthalide (GASSMANN), A., i, 487.
- Benzoylglycollic-*β*-naphthalide (GASSMANN), A., i, 487.
- Benzoylguaiacol. See Benzoic acid, guaiacol salt of.
- Benzoylhydrazonacetoacetic acid, ethylic salt of (CURTIUS), A., i, 39.
m-nitro-, ethylic salt of (CURTIUS), A., i, 39.
- Benzoylhydrazonepyruvic acid (VON PECHMANN), A., i, 680.
- Benzoyl-*p*-hydroxyazobenzene, constitution and hydrolysis of (McPHERSON), A., i, 28.
- Benzoyl-*β* hydroxy-*ε*-methylpyromucic acid (KIERMAYER), A., i, 144.
- 1'*-Benzoylindole-2'-carboxylic acid (REISSERT), A., i, 389.
- Benzoyllevalochloral (HARRIOT), A., i, 519.
- Benzoylmesitylene, behaviour of, towards phenylhydrazine (BAUM), A., i, 222.
- Benzoylmethylantibenzhydroxinic acid (WEBER and SUBAR), A., i, 431.
- Benzoylmethyl-*α*-ecgonine (WILLSTÄTTER), A., i, 708.
- Benzoylmethylic phenylic ether, oxime and phenylhydrazone of (FRITZ), A., i, 152.
- β*-Benzoyl-*α*-methylpropionic acid, *α*-cyanomethylic salt (KLOBB), A., i, 126.
- Benzoylmethylresoreinol (KOSTANECKI and TAMBOR), A., i, 44.
diacetate (KOSTANECKI and TAMBOR), A., i, 44.
dibenzoate (KOSTANECKI and TAMBOR), A., i, 44.
methyl ether (KOSTANECKI and TAMBOR), A., i, 44.
methylic ether, monacetate (KOSTANECKI and TAMBOR), A., i, 44.
- Benzoyl-3-methyl-5-isobutyl- Δ_2 -cyclohexenone (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-isobutyl- Δ_2 -cyclohexenone-4-carboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-isobutyl- Δ_2 -cyclohexenone-6-carboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-isobutyl- Δ_2 -cyclohexenone-4:6-dicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-hexyl- Δ_2 -cyclohexenone-4-carboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-hexyl- Δ_2 -cyclohexenone-6-carboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoyl-3-methyl-5-hexyl- Δ_2 -cyclohexenone-4:6-dicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Benzoylnaphthylphenylcarbazole (SCHÖPF), A., i, 244.
- h*-Benzoylnortropinonoxime (WILLSTÄTTER), A., i, 582.
- Benzoyloxyacanthine (POMMERHNE), A., i, 67.
- Benzoyloxygranatanine (CIAMICIAN and SILBER), A., i, 397.
- Benzoylpellotine (HEFFTER), A., i, 267.
- Benzoylphenofluorindine (KEHRMANN and BÜRGIN), A., i, 513.
- o*-Benzoylphenol. See *o*-Hydroxybenzophenone.
- Benzoylbis-1:2:3-phenylbenzoylmethylpyrazolone, identity of, with dibenzoylbisphenylmethylpyrazolone (AUTENRIETH), A., i, 700.
- Benzoylphenylmethylphenofluorindine (KEHRMANN and BÜRGIN), A., i, 512.
- β*-Benzoyl-*β*-phenylpropionic acid. See Desylacetic acid.

- 3-Benzoylphthalic acid and its ethylic salt (GRAEBE and LEONHARDT), A., i, 437.
- 3-Benzoylphthalic anhydride (GRAEBE and LEONHARDT), A., i, 437.
- 2-Benzoylisophthalic acid (GRAEBE and LEONHARDT), A., i, 437.
- β -Benzoylpropionic acid and its identity with phenacetylacetic acid (KLOBB), A., i, 126.
- α -cyano- (KLOBB), A., i, 126.
- Benzoylsagaresinotannol (HOHENADEL), A., i, 58.
- p*-Benzoylsalicylic acid and its salts (LIMPRICHT), A., i, 435.
- ethylic salt, benzoic derivative of (LIMPRICHT), A., i, 435.
- m*-nitro-, and its ethylic salt (LIMPRICHT), A., i, 435.
- Benzoylsandaracolic acid (BALZER), A., i, 493.
- d*-Benzoylsantonous acid, ethylic salt of (ANDREOCCI), A., i, 183.
- l*-Benzoylsantonous acid and its ethylic salt (ANDREOCCI), A., i, 184.
- Benzoylsantonous acid, racemic, ethylic salt of (ANDREOCCI), A., i, 184.
- Benzoylsarcosine, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- Benzoylscopoleine (MERCK), A., i, 65.
- Benzoyl-1 : 3 : 4 : 6-tetraphenyldihydropyridazine (SMITH and RANSOM), A., i, 322.
- Benzoyltetronic acid (WOLFF and SCHWABE), A., i, 523.
- Benzoyl-*o*-toluic acid, *m*-nitro-, and its salts (LIMPRICHT and FALKENBERG), A., i, 43.
- Benzoyl-*m*-toluic acids, *m*-nitro-, and its salts (LIMPRICHT and FALKENBERG), A., i, 43.
- Benzoyl-*m*-toluic chloride, *m*-nitro-, LIMPRICHT and FALKENBERG), A., i, 43.
- α -Benzoyltricarballic acid, ethylic salt of (EMERY), A., i, 436.
- β -Benzoyltricarballic acid, ethylic salt of (EMERY), A., i, 436.
- Benzoyl- ψ -tropeine and its salts (WILLSTÄTTER), A., i, 452.
- n*-Benzoyltropigenine (WILLSTÄTTER), A., i, 582.
- Benzoyl- ψ -tropigenine (WILLSTÄTTER), A., i, 655.
- n*-Benzoyl- ψ -tropigenine, formation of (WILLSTÄTTER), A., i, 709.
- Benzoylurethane (VON PECHMANN and VANINO), A., i, 33.
- Benzoylvanillin (WÖRNER), A., i, 226.
- Benzoylveratrole (BRÜGGEMANN), A., i, 356.
- Benzoylveratrolephenylhydrazone (BRÜGGEMANN), A., i, 356.
- Benzoylxylan (BADER), A., i, 335.
- Benzyl methyl ketone, oxime of, and its acetyl and benzoyl derivatives (KOLB), A., i, 577.
- dioxime of, and its benzyl and dibenzyl ethers (KOLB), A., i, 577.
- Benzyl methyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1090, 1190, 1241.
- Benzylamine, magnetic rotatory power, &c., of (PERKIN), T., 1103, 1157, 1208, 1245.
- action of sulphur nitride on (SCHENCK), A., i, 427.
- condensation of, with 1 : 4-chloronitrobenzene (KEHRMANN and TIKHVINSKY), A., i, 511.
- Benzylamine, *o*-amino-, condensation of, with *m*-nitrobenzaldehyde, and *p*-hydroxybenzaldehyde (BUSCH), A., i, 509.
- condensation of, with salicylaldehyde (BUSCH), A., i, 508.
- 5-Benzylamino-1-benzyltetrazole: its hydrochloride, nitrate, sulphate, and nitrite, and its nitrosamine (THIELE and INGLE), A., i, 109.
- Benzylaminotetrazoles, α - and β - (THIELE and INGLE), A., i, 109.
- Benzyl-*p*-aminophenetol (WENGHÖFFER), A., i, 360.
- Benzylaniline, magnetic rotatory power, &c., of (PERKIN), T., 1102, 1209, 1232, 1245.
- acetyl derivative of (BLACHER), A., i, 33.
- 4-nitro- (KEHRMANN and TIKHVINSKY), A., i, 511.
- Benzyl-*o*-anisidine, *o*-amino-, and its dihydrochloride (BUSCH, BRUNNER, and BIRK), A., i, 160.
- condensation of, with benzaldehyde (BUSCH), A., i, 507.
- o*-nitro- (BUSCH, BRUNNER, and BIRK), A., i, 160.
- Benzyl-*p*-anisidine, *o*-amino- (BUSCH and HARTMANN), A., i, 160.
- Benzyl-*o*-benzoiesulphinide (ECKENROTH and KOERPPEN), A., i, 438.
- p*-nitro- (ECKENROTH and KOERPPEN), A., i, 438.
- Benzylbenzylidenebenzyltetrazylhydrazine (THIELE and INGLE), A., i, 109.
- Benzyl-*p*-bromaniline, *o*-amino-, salts of (BUSCH and HEINEN), A., i, 159.
- Benzylbromethylamine and its salts (GABRIEL and STELZNER), A., i, 702.
- Benzylcamphor, crystallography of (MINGUIN), A., i, 694.

- ab*-Benzylcarboxyethylthiocarbamide (DOBAN), T., 327; P., 1896, 74.
- Benzyl-*o*-chloraniline, *o*-amino-, and its hydrochloride (BUSCH and BRUNNER), A., i, 157.
- o*-nitro-, and its hydrochloride (BUSCH and BRUNNER), A., i, 157.
- Benzyl-*m*-chloraniline, *o*-amino-, and its hydrochloride (BUSCH and FRANCIS), A., i, 158.
- o*-nitro- (BUSCH and FRANCIS), A., i, 158.
- Benzyl-*p*-chloraniline, *o*-amino-, and its hydrochlorides (BUSCH and VOLKENING), A., i, 158.
- o*-nitro-, salts of (BUSCH and VOLKENING), A., i, 158.
- β -Benzylcrotonic acid, β -thio-, and its salts (AUTENRIETH), A., i, 617.
- β -Benzylisocrotonic acid, β -thio-, and its salts (AUTENRIETH), A., i, 617.
- Benzyl-desmotroposantonin (ANDREOCCI), A., i, 182; (CASTORO), A., i, 307.
- Benzylisodesmotroposantonin (ANDREOCCI), A., i, 183.
- Benzyl-desmotroposantonous acid (ANDREOCCI), A., i, 185; (CASTORO), A., i, 307.
- Benzyl-dibromodiethylamine, hydrochloride of (GABRIEL and STELZNER), A., i, 702.
- Benzyl-dihydroxydiethylamine (GABRIEL and STELZNER), A., i, 702.
- Benzyl-dimethylamine, preparation of (HOFMANN LECTURE), T., 670.
- α -Benzylethylene- ψ -thiocarbamide, thiocyanate of (GABRIEL and STELZNER), A., i, 702.
- 1':3'-Benzylethylphthalazone (BROMBERG), A., i, 579.
- Benzylhydroxyethylamine and its salts (GABRIEL and STELZNER), A., i, 702.
- Benzyl alcohol, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1090, 1125, 1198, 1242.
- chloride, magnetic rotatory power, &c., of (PERKIN), T., 1120, 1203, 1243.
- cyanide. See Phenylacetone nitrile.
- hydrosulphide, *o*-nitro- (GABRIEL and STELZNER), A., i, 215.
- iodide, *p*-bromo- (HANTZSCH and SCHULTZE), A., i, 672.
- methyl sulphide, *o*-amino-, and its hydrochloride (GABRIEL and STELZNER), A., i, 216.
- o*-nitro- (GABRIEL and STELZNER), A., i, 215.
- sulphide, magnetic rotatory power, &c., of (PERKIN), T., 1124, 1204, 1244.
- Benzylidene diethyl ether, preparation of (BUSCH), A., i, 677.
- Benzylidenacenaphthenone-oxime (GRAEBE and JEQUIER), A., i, 444.
- Benzylideneacetamidoacetohydrazide (RADENHAUSEN), A., i, 138.
- Benzylideneacetoacetic acid (SCHIFF), A., i, 84.
- ethylic salt (KNOEVENAGEL), A., i, 232.
- action of hydroxylamine on (KNOEVENAGEL and RENNER), A., i, 189.
- oxime of, and its ammonium salt (KNOEVENAGEL and RENNER), A., i, 189.
- Benzylideneacetone. See Styryl methyl ketone.
- Benzylideneacetophenone. See Styryl phenyl ketone.
- Benzylideneaminoacetylthymol (?) (PLANCHER), A., i, 358.
- o*-Benzylideneaminobenzhydrazide, *m*-nitro- (KRATZ), A., i, 366.
- Benzylidene-*o*-aminobenzyl-*p*-bromaniline (BUSCH and HEINEN), A., i, 159.
- p*-nitro- (BUSCH and HEINEN), A., i, 159.
- Benzylidene-*o*-aminobenzyl-*p*-bromophenylhydrazine (BUSCH and HEINEN), A., i, 160.
- Benzylidene-*o*-aminobenzyl-*p*-chloraniline (BUSCH and VOLKENING), A., i, 158.
- m*-nitro- (BUSCH and VOLKENING), A., i, 158.
- Benzylidene-*o*-aminobenzyl-*p*-chlorophenylhydrazine (BUSCH and VOLKENING), A., i, 159.
- Benzylidine-*o*-aminobenzyl-*p*-phenetidine (BUSCH and HARTMANN), A., i, 160.
- Benzylidencaminophenylimido- β -butyric acid, *p*-nitro-, ethylic salt of (HINSBERG and KOLLER), A., i, 537.
- Benzylidencaminothymol and its acetyl derivative (PLANCHER), A., i, 358.
- Benzylidencanhydroglycogallol and its diethyl ether (KESSELKAUL and KOSTANECKI), A., i, 606.
- Benzylidencaniline (BARSILOWSKY), A., i, 358.
- nitro- (BARSILOWSKY), A., i, 358.
- Benzylidencanilinoacetohydrazide (RADENHAUSEN), A., i, 138.
- Benzylideneazine, tetrabromide and dihydrobromide of (CURTIUS and QUEDENFELDT), A., i, 29.
- α -Benzylidenebenzyltetrazylhydrazine and its hydrochloride (THIELE and INGLE), A., i, 109.

- β -Benzylidenebenzyltetrazylhydrazine (THIELE and INGLE), A., i, 110.
- Benzylidenebisacetonedicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 212.
- Benzylidenebismethylcarbamide (SCHIFF), A., i, 529.
- Benzylidenebiuret and the action of alkalis and alkylic iodides on (SCHIFF), A., i, 529.
- Benzylidenediaetonaminoxime (HARRIES), A., i, 318.
- Benzylidenediacetophenone (v. KOSTANECKI and ROSSBACH), A., i, 556.
- Benzylidenediaminopentamethylene-tetramine, di-*m*-nitro- (DUDEN and SCHARFF), A., i, 123.
- Benzylidene- β -dibenzyltetrazylhydrazine (THIELE and INGLE), A., i, 109.
- Benzylidenedicarbamide, and the action of heat on (SCHIFF), A., i, 529.
- Benzylidene-ethylbiuret (SCHIFF), A., i, 529.
- Benzylidene-eucarvone (WALLACH), A., i, 573.
- Benzylidenehydrazinoisobutyric acid (THIELE and HEUSER), A., i, 340.
- Benzylidenehydrazinecarboxylic acid, ethylic salt (THIELE and LACHMANN), A., i, 208.
- Benzylideneimide, salts of (BUSCH), A., i, 677.
- Benzylideneketopentamethylene. See Benzylidenecyclopentanone.
- Benzylidenelactamide (FISCHER), A., i, 263.
- Benzylidenementhone hydrochloride, hydrobromide, and oxime (WALLACH), A., i, 573.
- Benzylidenemethylbiuret (SCHIFF), A., i, 529.
- Benzylidenemethylhexenone, oxime of (WALLACH), A., i, 572.
- 4-Benzylidene-5-methylketoisooxazolone (SCHIFF), A., i, 83.
action of alkalis on (SCHIFF), A., i, 83, 84.
- Benzylmethylnitramine (FRANCHIMONT and VAN ERP), A., i, 298.
o-nitro- (FRANCHIMONT and VAN ERP), A., i, 298.
p-nitro- (FRANCHIMONT and VAN ERP), A., i, 298.
- β -Benzylidene- γ -methylisooxazolone (KNOEVENAGEL and RENNER), A., i, 189.
- Benzylidene-1 : 2-naphthylenediamine (HINSBERG and KOLLER), A., i, 537.
- Benzylidenecyclopentanone (VORLÄNDER and HOBOM), A., i, 604.
- Benzylidene-*o*-phenylenediamine (HINSBERG and KOLLER), A., i, 536.
- Benzylidenepulegone (WALLACH), A., i, 573.
- 4-Benzylidenepyrazolone (KNORR), A., i, 260.
- Benzylidenetriacetophenone (v. KOSTANECKI and ROSSBACH), A., i, 557.
- Benzylidene, cyano-. See 5-Phenyl-2 : 6-dibenzyl-*m*-diazine, 4-amino-.
- Benzylisodesmotroposantonin (ANDREOCCI), A., i, 183.
- Benzylmalonic acid, ethylic salt, hydrolysis of (HJELT), A., i, 205.
o-nitro-, and its hydrolysis (REISSERT), A., i, 389.
ammonium salts (REISSERT), A., i, 389.
ethylic salt of (REISSERT), A., i, 371.
- 1' : 3'-Benzylmethylphthalazone (BROMBERG), A., i, 579.
- Benzylmorpholine and its hydrochloride and salts (GABRIEL and STELZNER), A., i, 702.
- p*-Benzylloxybenzaldehyde (WÖRNER), A., i, 225.
 α -trithio- (WÖRNER), A., i, 226.
 β -trithio- (WÖRNER), A., i, 226.
- 5-Benzylloxy-1-benzyltetrazole (THIELE and INGLE), A., i, 109.
- β -Benzylloxerotonie acid and its potassium salt (AUTENRIETH), A., i, 617.
- β -Benzylloxypropylene (AUTENRIETH), A., i, 617.
- Benzyl-*p*-phenetidine, *o*-amino-, and its salts (BUSCH and HARTMANN), A., i, 160.
- Benzylphenonaphthazone. See Benzylrosindone; Benzylrosinduline.
- Benzyl-*o*-phenylenediamine, condensation of, with acetamido- α -naphthaquinone and hydroxy- α -naphthaquinone (KEHRMANN and TIKHVINSKY), A., i, 511.
- Benzylphosphine, preparation of (HOFMANN LECTURE), T., 682.
- 1'-Benzylphthalimidine (BROMBERG), A., i, 579.
- β -Benzylpropylene, β -thio- (AUTENRIETH), A., i, 617, 618.
- Benzylrosindone (KEHRMANN and TIKHVINSKY), A., i, 511.
- Benzylrosinduline (KEHRMANN and TIKHVINSKY), A., i, 511.
chloride, acetyl derivative of (KEHRMANN and TIKHVINSKY), A., i, 511.
- l*-Benzylsantonous acid (ANDREOCCI), A., i, 184.
- Benzylsuccinimide (BLACHER), A., i, 33.
velocity of decomposition by hydrochloric acid of (MIOLATI), A., ii, 242.

- Benzyl-*o*-sulphamidobenzoic acid and its salts (ECKENROTH and KOERPPEN), A., i, 438.
- p*-nitro-, and its potassium salt (ECKENROTH and KOERPPEN), A., i, 438.
- α -Benzyltetrazylhydrazine and its hydrochloride (THIELE and INGLE), A., i, 110.
- Benzyl-*o*-toluidine, *o*-amino-, condensation of, with benzaldehyde (BUSCH), A., i, 507.
- Benzyl-*p*-toluidine, *o*-amino-, condensation of, with benzaldehyde (BUSCH), A., i, 507.
- Benzyltrimethylammonium chloride and hydroxide, action of heat on (HOFMANN LECTURE), T., 670.
- Benzylvinylamine (GABRIEL and STELZNER), A., i, 702.
- Berberamine, composition of (POMMEREHNE), A., i, 67.
- Berberine, salts of (POMMEREHNE), A., i, 67.
- Berberis aquifolium*, alkaloids of (POMMEREHNE), A., i, 67.
- Bergamot oil, analysis of (BÖRNTRAGER), A., ii, 228, 679.
- Bertholletia excelsa*, proteids of (OSBORNE and CAMPBELL), A., i, 716.
- Beryl, alkalis in (BENNEVILLE), A., ii, 186.
- from Limoges, fluorine in (LEBEAU), A., ii, 187.
- from New South Wales (LIVERSIDGE), A., ii, 657.
- Beryllium, preparation of (BORCHERS), A., ii, 521.
- preparation of, from emerald (WARREN), A., ii, 247.
- carbide (LEBEAU), A., ii, 169; (HENRY), A., ii, 169.
- oxide, preparation of, from emerald (LEBEAU), A., ii, 168.
- purification of (HART), A., ii, 168.
- niobate (LARSSON), A., ii, 564.
- separation of, from iron (ATKINSON and SMITH), A., ii, 220.
- erzeliite (*kühnite*), composition of (SJÖGREN), A., ii, 113.
- eta vulgaris*, diastatic ferment in (GONNERMANN), A., ii, 381.
- See also Agricultural chemistry. (Appendix.)
- etine, occurrence of, in *Vicia sativa* (SCHULZE), A., ii, 208.
- tol. See Salicylic acid, β -naphthylie salt of.
- tula lenta*, existence of gaultherase in (BOTRQUELOT), A., ii, 540.
- tulase. See Gaultherin.
- Bidiphenyl, preparation of, from *p*-bromodiphenyl; identification of with benzerythrene (NOYES and ELLIS), A., i, 51.
- Bidiphenylene-ethane, dinitro- (GRAEBE and STINDT), A., i, 565.
- Bidiphenylene-ethylene (*Tetraphenylene-ethylene*) (LOHSE), A., i, 619; (KLINGER and LONNES), A., i, 692.
- formation of, from fluorene (GRAEBE and VON MANTZ), A., i, 442.
- oxidation of (GRAEBE and VON MANTZ), A., i, 442.
- dibromide and dichloride (GRAEBE and VON MANTZ), A., i, 442.
- glycol and its acetate (GRAEBE and STINDT), A., i, 566; (KLINGER and LONNES), A., i, 691.
- oxide (GRAEBE and STINDT), A., i, 566; (KLINGER and LONNES), A., i, 691.
- Bilberries, dye of (WEIGERT), A., i, 388.
- Bilberry juice, constituents of (NACKEN), A., ii, 495.
- Bile, urobilin from human (GARROD and HOPKINS), A., i, 712.
- Bilirubin, absorption spectrum of (GAMGEE), A., i, 714.
- action of, on iodine (THUDICHUM), A., i, 516.
- Bimolecular reactions. See Reactions.
- Biotite from Japan (KOTŌ), A., ii, 39.
- from the Plomb du Cantal (FOUQUÉ), A., ii, 533.
- altered, from Styria (CANAVAL), A., ii, 483.
- alteration of, to Caswellite (CHESTER), A., ii, 309.
- Birotation. See Light.
- Bisethylbenzoylcarbinol (FRITZ), A., i, 152.
- Bishydroxytetrahydronaphthylamine hydrochloride, aurochloride, and platinochloride (BAMBERGER and LODTER), A., i, 100.
- Bismuth, electrical resistance of, at low temperatures (DEWAR and FLEMING), A., ii, 5.
- rate of diffusion of, in mercury (HUMPHREYS), T., 251; P., 1896, 9.
- Bismuth bromide, action of air and nitric peroxide on (THOMAS), A., ii, 527.
- chloride, action of nitric peroxide on (THOMAS), A., ii, 429.
- dichloride, action of air or nitric peroxide on (THOMAS), A., ii, 527.
- iodide, action of air or nitric peroxide on (THOMAS), A., ii, 527.
- sulphide, physical change produced by gently heating (SPRING), A., ii, 290.

- Bismuth, separation of, from metals of the copper and iron groups (JANNASCH and GROSSE), A., ii, 677.
- Bismuthite from Quebec (HOFMANN), A., ii, 259.
- Bisnitrosotetrahydrocarvone, oxime of (VON BAEYER), A., i, 248.
- Bisphenylmethylpyrazolone and its diacetyl, dibenzoyl, and disulphonyl derivatives (AUTENRIETH), A., i, 627, 700.
- Bisphenylpyrazolonecarboxylic acid, ethylic salt of (RUHEMANN), T., 1396; P., 1896, 166.
- bis*-Toluediazoinide from *p*-diazotoluene anhydride (BAMBERGER), A., i, 299.
- Biuret, preparation of, from carbamide (SCHIFF), A., i, 634.
- and certain metallic derivatives of (SCHIFF), A., i, 284.
- action of mercuric nitrate on (SCHIFF), A., i, 634.
- potassium hydroxide and the action of copper acetate on it (SCHIFF), A., i, 634.
- sodium hydroxide (SCHIFF), A., i, 634.
- reactions of (SCHIFF), A., i, 284.
- Biuret-reaction, substances giving the (SCHIFF), A., i, 632, 634.
- Blende, alteration products of (CESÀRO), A., ii, 479.
- containing gallium and indium from New South Wales (KIRKLAND), A., ii, 183.
- Blood, causes of absorption of liquids into the (STARLING), A., ii, 438.
- effects of changes of osmotic pressure in (LEATHES), A., ii, 196.
- percentage of creatinine in (COLLS), A., ii, 666.
- presence of compounds of cholesterol in (HÜRTHE), A., ii, 485.
- influence of certain salts on the coagulation of (HORNE), A., ii, 437.
- antagonistic influence of certain salts on the coagulation of (RINGER), A., ii, 49.
- coagulability of, as influenced by peptone injections (STARLING), A., ii, 197.
- coagulability of, in albino animals (PICKERING), A., ii, 664.
- nature of fibrin-ferment of (PEKELHARING), A., ii, 488.
- gases of the, Lothar Meyer's investigations on the (BEDSON), T., 1410; P., 1896, 119.
- relation of, to respiratory movements (FILEHNE and KIONKA), A., ii, 118.
- Blood, formation of hæmoglobin in, from inorganic iron (KUNKE), A., ii, 47.
- oxyhæmoglobin from horse's (JUTT), A., i, 584.
- oxidising powers of the (ABELOUS and BIARNES), A., ii, 119.
- a sugar-forming ferment present in the (BOURQUELOT and GLEY), A., ii, 119.
- sugar in the, diminished by ligaturing the intestinal arteries (TANGL and HARLEY), A., ii, 47.
- distribution of urea between corpuscles and plasma of (SCHÖNDORFF), A., ii, 375.
- alterations of, in anæmia (MORACZEWSKA), A., ii, 618.
- in potassium chlorate poisoning (BRANDENBURG), A., ii, 491.
- action of acetylene on (BROCINER), A., ii, 264.
- Blood, estimations of alcohol in the, during alcoholic poisoning (GRÉHANT), A., ii, 664.
- estimation of carbonic oxide in (HALDANE), A., ii, 52.
- estimation of colour of, by the colorimetric pipette (HOPPE-SEYLER and WINTERNITZ), A., ii, 552.
- estimation of colouring matter in (JUTT), A., i, 584.
- estimation of sugar in (REID), A., ii, 678.
- estimation of urea in (KAUFMANN), A., ii, 130; (SCHÖNDORFF), A., ii, 131.
- Blood-corpuscles, estimation of the number of (OLIVER), A., ii, 437.
- Blood-plasma, osmotic pressure of (KOEPE), A., ii, 376.
- Blood-serum, initial rate of osmosis of (BARLOW), A., ii, 664.
- Boiling point. See Heat.
- Boleite, artificial (FRIEDEL), A., ii, 32.
- from Broken Hill, N.S.W. (LIVERSIDGE), A., ii, 32.
- Boletus cyanescens*, oxidising ferment of (BOURQUELOT and BERTRAND), A., ii, 383.
- Bone, causes of brittleness of, in animals (KELLNER, KÖHLER, and BURNSTEIN), A., ii, 46.
- Boracite, formula of (KOSMANN), A., ii, 368.
- Borax. See Boron.
- Boric acid. See Boron.
- Borneol from oil of valerian (OLIVIERO), A., i, 492.
- from pinene (REYCHLER), A., i, 308.
- relation of, to isoborneol (JÜNGER and KLAGES), A., i, 313.

iso-Borneol, salt of, from camphene (REYCHLER), A., i, 308.
 Bornylic acetate in oil of *Abies canadensis* (UMNEY), A., i, 380.
iso-Bornylic acetate from camphene hydrochloride (JÜNGER and KLAGES), A., i, 313.
 chloride from *isoborneol* camphene (REYCHLER), A., i, 313.
 Borolanite from N. Scotland (TEALL and HORNE), A., ii, 117.
 Boron.
 Boric acid, occurrence of, in vegetable and animal products (JAY), A., ii, 327.
 amount of, in wine and in cider (JAY and DUPASQUIER), A., ii, 76.
 detection of (VILLIERS and FAYOLLE), A., ii, 75.
 detection of, apparatus for (DOHERTY), P., 1896, 101.
 estimation of (JAY and DUPASQUIER), A., ii, 76.
 estimation of, source of error in (GORGES), A., ii, 575.
 estimation of, volumetrically (BARTHE), A., ii, 337; (JÖRGENSEN), A., ii, 449.
 Borates in the Stassfurt Abraham salts (KOSMANN), A., ii, 368.
 Borax, effect of, on milk-curdling (ALLEN), A., ii, 489.
 Bouquet of wines, cause of the (MÜLLER), A., ii, 201.
 Bournonite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
 Bran, dry distillation of, with lime (LAYCOCK), P., 1896, 38.
Brassica rapa, arginine in the tubers of (SCHULZE), A., ii, 383.
 Brassylic acid (SPIECKERMANN), A., i, 410.
 Brazilintrimethylic ether. See Trimethylbrazilin.
 Breath, estimation of acetone in (GEELMUYDEN), A., ii, 679.
 Breithauptite from Sardinia (LOVISATO), A., ii, 183.
 Bricks, efflorescence on, exposed to sulphurous anhydride (PATERSON), T., 66; P., 1895, 203.
 Britannia-violet, discovery of (HOFMANN LECTURE), T., 618.
 Bromal hydrate, crystalline forms of (POPE), P., 1896, 142.
 Bromic acid. See Bromine.
 Bromine, absorption spectrum of solutions of, in carbon bisulphide vapour (WOOD), A., ii, 458.
 crystallisation of (ARCTOWSKI), A., ii, 17.

Bromine, partition of, between salt solutions and carbon bisulphide and tetrachloride (JAKOWKIN), A., ii, 514.
 detection of, by dichlorobenzenesulphonamine (KASTLE), A., ii, 216.
 detection of, in organic compounds (RAIKOW), A., ii, 70.
 separation of, quantitatively from chlorine (BUGARSZKY), A., ii, 216.
 Hydrogen bromide, preparation of (KASTLE and BULLOCK), A., ii, 356.
 gaseous, action on salts of elements of the fifth group (SMITH and MEYER), A., ii, 165.
 action of sulphuric chloride on (BESSON), A., ii, 417.
 Bromides, effect of, on algæ (WYPLEL), A., ii, 266.
 estimation of, by potassium cyanide (DENIGÈS), A., ii, 386.
 Bromic acid, velocity of the reaction between hydriodic acid and (NOYES and SCOTT), A., ii, 158.
 Bromo-derivatives of aromatic hydrocarbons, action of, on lead salts of thiophenols (BOURGEOIS), A., i, 17.
 Bromo-derivatives. See also :—
 Acenaphthenone.
 Acetamide.
 Acetamidobenzene.
 Acetamidophenol.
 1-Acetamidoquinoline.
 Acetanilide.
 Acetoacetic acid.
 Acetonyl-*o*-benzoicsulphinide.
 Acetoxime.
 1 : 2 : 4-Aceto-*m*-xyleneamide.
 Acetylcarbazole.
 Acetylmalic acid.
 Alizarin.
 Allylene.
 Allylthiocarbamide.
 Amylene and β -*iso*-Amylene.
 Anethoil and *iso*-Anethoil.
 Aniline.
 Anilinesulphonic acids.
 o-Anisidine.
 Anisoil.
 Anthracene.
 Anthraquinones.
 Apiole and *iso*-Apiole.
 Apione.
 Benzsyaldoxime.
 Benzamidosulphonic acid.
 Benzene.
 Benzenediazonium.
 Benzenediazoxide.
 Benzenesulphonamide.
 Benzene-*o*-sulphonic acid, cyano-.
 Benzenyloxime.

Bromo-derivatives. See :—

Benzoic acid.
 Benzoiesulphinide.
 Benzoylcarbazole.
 Benzoylhydrazine.
 Benzyl dibromodietethylamine.
 Benzylethylamine.
 Benzylic iodide.
iso-Butylacetic acid.
 Butylamine.
 Butyric acid and *iso*-Butyric acid.
 Butyroylmalic acid and *iso*-Butyroylmalic acid.
 Camphenone.
 Campholide.
 Camphor.
 Camphoric acid.
 Camphoric anhydride.
 Carbazole.
 Cinnamic acids.
 Citraconic acid.
 Collidine.
 ψ -Cubebin.
 ψ -Cumeneol.
 Dehydrothiotoluidine.
m-Diacetophenylenediamide.
 Diazobenzene anhydride.
 Diazobenzenephenylhydrazone-methanedisulphonic acid.
 Diazobenzenethiophenyl ethers.
 Dibenzoylacetylmethane.
 Dibenzylhydantoin.
 2 : 4-Diethoxyacetophenone.
 Diethoxyxylenol.
 2 : 4-Dihydroxyacetophenone.
 Dihydroxyhexahydrocymenes.
 Dihydroxytetramethylstilbene.
 3 : 3-Dimethoxybenzophenone.
 Dimethoxyquinone.
 3 : 3-Dimethoxythiobenzophenone.
 Dimethoxytriphenylmethanecarboxylic acid.
 Dimethoxyxylenol.
 Dimethylaminodiphenazone.
 Dimethylaniline.
m- and *p*-Dimethylaniline-*m*-sulphonic acids.
 Dimethylbarbituric acid, nitro-.
 Dimethylglutaric anhydride.
 Dimethylmalonimide.
 μ -Dimethylpentiazoline.
 Diphenacyl.
 Diphenazone-*o*-hydroxycarboxylic acid.
 Diphenoxyquinone.
 Diphenyldimethyltetrahydro- γ -pyrone.
 Diphenylmethenylamidine.
 4 : 5-Diphenyl-2 : 7-octanedione.
 Diphenylparaconic acid.
 Dipropylacetic acid.
 Dipropylisopropyl alcohol.

Bromo-derivatives. See :—

Dithienyl.
 Ethoxyanethoil.
 2-Ethoxybenzylideneacetone.
 Ethoxy- ψ -cumeneol.
 μ -Ethoxypentiazoline.
 Ethoxyxylenol.
 Ethyl-*o*-benzoiesulphinide.
 Ethylene.
 Ethylketole.
 Ethylmesitylene.
p-Ethyltoluene.
p-Ethyltoluenesulphonic acid.
 Ethyltriethylphosphonium.
 Flonorenone.
 Formamidobenzene.
 Formanilide.
 Formazylsulphonic acid.
 Fumaric acid.
 Gallie acid.
 Heptoic acids.
 Hexadecylene.
 Hexahydro-*p*-xylic acid.
 Hexoic acids.
 Hexylene.
 Hippenylcarbanil.
 Homopiperonylic acid.
 Hydrindone.
p-Hydroxybenzaldehyde.
 Hydroxybenzaldoxime.
 Hydroxybenzoic acid.
o-Hydroxybenzophenone.
 Hydroxybenzylideneacetone acetate and Benzoate (under the respective acids).
o-Hydroxybenzylidenediacetophenone.
 Hydroxybenzylideneaniline.
 Hydroxybenzylidenenaphthylamine.
 Hydroxybenzylidenetoluidine.
 Hydroxy- ψ -cumeneol.
 Hydroxydimethylglutaric lactone.
 Hydroxydiphenylaminecarboxylic acid.
 Hydroxynaphthadiphenazone.
 Hydroxynaphthylhydroxyphenylamine.
 Hydroxyphenyl styryl ketone.
 4-Hydroxy-5-phenyl-2 : 6-dibenzyl-*m*-diazine.
 Hydroxyquinolines.
 Imidocarbonic acid.
 Indophenazine.
 Ketostearic acid.
 β -Lapaehone.
 Levulinic acid.
 Luteolin.
 Maleic acid.
 Maleic anhydride.
 Maleimide.
 Maleinanil.
 Malein-*p*-tolil.
 Maleinuric acid.

Bromo-derivatives. See :—

Malonic acid.
Menthone.
Menthylamine.
Meroquinene.
Mesaconic acid.
Mesitylene.
Methane.
Methanesulphonopropionic acid.
Methoxy- ψ -cumenol.
Methoxyethoxypropylbenzene.
 μ -Methoxypentthiazoline.
Methoxyphenyl ethyl ketone.
Methoxyxylene.
Methyl hydroxyethyl ketone.
Methylacetoacetic acid.
Methylacetylene.
Methylaniline.
 α -Methylbutyric acid (valeric acid).
Methylenecaffeic acid.
 μ -Methylpentthiazoline.
Methylisopropylacetylene.
Methyltaurocarbamic acid, chloro-.
Methylisovaleric acid (hexoic acid).
Morin.
Myricetin.
Naphthalene.
Naphthaquinonecarboxylic acid.
Naphthol.
Naphthylaminopentthiazolines.
 α -Naphthyl carbonates.
iso-Narcotine.
Opianic acid β -naphthylamine.
Pentacetylmorin.
Pentadecic acid.
cyclo-Pentene.
Pentthiazoline.
Peonol.
Phenol.
Phenolphthalein.
Phenyl- α -coumaryl ketone.
Phenyl hydroxystyryl ketone.
Phenyl tolyl ketones.
Phenylaminobenzylhydrazine.
Phenyldibenzyl-*m*-diazine.
Phenyldihydro- β -phenotriazine.
4'-Phenyldihydroquinazoline.
m-Phenylenediamine.
Phenylenediurethane.
Phenylic ethylic ether.
Phenylic γ -bromopropylic ether.
Phenylketotetrahydroquinazoline.
Phenylmalonic acid.
Phenylmethylaminopentthiazoline.
Phenylnitrobenzyl nitrosamine.
Phenyl nitromethane.
Phenyl *iso* nitromethane.
Phenylthiotetrahydroquinazolines.
Phthalic acid.
Phthalic anhydride.
iso-Phthalic acid.
Pinic acid.

Bromo-derivatives. See :—

μ -Piperidylpentthiazoline.
Piperonylnitroacetone.
Piperonylonitrile.
Piperylenedicarboxylic acid.
Propaneoxy methane.
Propene.
Propeneoxymethane.
Propine.
Propineoxymethane.
Propionic acid.
Propionylmalic acid.
 μ -Propoxypentthiazoline.
Propylbenzene.
Propylene.
Propylenepseudothiocarbamide.
Propylmesitylene.
1-Propylpiperidine, γ -.
Propylthiocarbimide.
Propylthiourea.
Propylvalerolactone.
Protocatechuic acid.
Pyridine.
Pyroxanthine.
Quinoline.
Resacetophenone.
Resorcinol.
Resorcinol diethyl ether.
Ricinin.
Ricininic acid.
Succinamic acid.
Succinanyl.
Succinanyllic acid.
Succinic acid.
Succino- β -naphthyllic acid.
Succino-*p*-tolilic acid.
Sulphamidobenzamide.
3-Sulphamidobenzoic acid.
Sulphobromobenzoic acid.
Sulphochlorobenzoic acid.
Terephthalic acid.
Terpene.
Tetracetyl luteolin.
Tetrahydrocarvonebisnitrosylic acid.
Tetrahydrocuminic acid.
Tetric acid.
Tetronic acid.
Theophylline.
Thienyltriphenylmethane.
Thiocarbonylacetoacetic acid.
Toluene.
o- and *p*-Tolylaminopentthiazolines.
Tribenzaldehyde.
Tribenzoylmethane.
Trimethylethylammonium.
Trimethylethylene.
 $\alpha\alpha\beta$ -Trimethylglutaric acid.
Trimethylglutaric anhydride.
Trimethylindolium hydroxide.
Trimethylpropionic acid.
Tiresorcinol.
Tropinone.

- Bromo-derivatives. See:—
 Undecylenic acid (hendecenoic acid).
 Valeric acid and *iso*-Valeric acid.
 Veratrol.
 Vinylcyclopropane.
 Xanthine.
 Xylenol.
- Bromoform (WOLFF and SCHWABE),
 A., i, 523.
 freezing points of solutions in (AMPOLA and MANUELLI), A., ii, 238.
- Brongniartite from Broken Hill,
 N.S.W. (SMITH), A., ii, 30.
- Brucine, detection of (FORMÁNEK), A.,
 ii, 401.
 titration of, by iodine (KIPPENBERGER), A., ii, 682.
- Brushite, artificial (GAUTIER), A., ii, 185.
- Burette, gas, modification of (BLEIER),
 A., ii, 70, 271, 573.
- Bunsen's, modification of (SCHATERNIKOFF and SETSCHENOFF), A., ii,
 332.
- Burnite, from Burma (HELM), A., ii,
 252.
- Burner, a new Bunsen (DIERBACH), A.,
 ii, 415.
- iso*-Butaldehyde, action of alcoholic
 soda on (URBAIN), A., i, 590.
 action of zinc and ethylic bromo-
 butyrate on (REFORMATSKY), A.,
 i, 128.
 action of cyanacetic acid on (BRAUN),
 A., i, 594.
 action of formaldehyde and potash on
 (JUST), A., i, 403.
 action of malonic and acetic acids on
 (BRAUN), A., i, 594.
 action of potash on (FRANKE), A.,
 i, 404.
- iso*-Butaldehyde, cyano-, acetate of
 and the action of hydrogen chlor-
 ide on it (COLSON), A., i, 284.
- cyclo*-Butane-1 : 3-dioxalylic acid and
 its salts (KALTWASSER), A., i,
 670.
 phenylhydrazide of (KALTWASSER),
 A., i, 670.
- cyclo*-Butane-1 : 3-dioxalylic anhydride
 (KALTWASSER), A., i, 670.
- Butanetricarboxylic acid, ethylic salt,
 velocity of hydrolysis of (HJELT), A.,
 i, 600.
- Butane- $\alpha\gamma\gamma$ -tricarboxylic acid, ethylic
 salt of (AUWERS and TITHERLEY),
 A., i, 642.
 action of sulphuric acid on (AUWERS
 and TITHERLEY), A., i, 642.
- iso*-Butenylbenzene. See Phenylbutyl-
 ene.
- Butenylic alcohol (*crotonylic alcohol*)
 (CHARON), A., i, 637.
- Butenylic alcohol, action of acids or
 anhydrides on (CHARON), A., i, 66.
 action of acid chlorides on (CHARON),
 A., i, 662.
 action of zinc-copper couple on
 (CHARON), A., i, 661.
 salts of (CHARON), A., i, 661.
- Butter. See Agricultural chemistry.
 (Appendix).
- Butterflies, pigments of (HOPKINS),
 A., ii, 198.
- Butyl α -hydroxyamyl ketone, density of
 (ANDERLINI), A., i, 203.
- iso*-Butylacetic acid. See *iso*-Hexoic
 acid.
- iso*-Butylacetoacetic acid, ethylic salt,
 rate of formation of (BISCHOFF), A.,
 i, 85.
- iso*-Butylallylcarbinol. See Octenylic
 alcohols.
- Butylamine, β -bromo-, hydrobromide of
 (BOOKMAN), A., i, 200.
 β -chloro- (BOOKMAN), A., i, 200.
 γ -chloro- (BOOKMAN), A., i, 200.
 its salts and benzoyl derivative
 (LUCHMANN), A., i, 545.
- iso*-Butylamine, action of carbon bi-
 sulphide on (PONZIO), A., i, 636.
- iso*-Butylamines (BERG), A., i, 8.
- iso*-Butylanhydrodibenzilacetoacetic
 acid (JAPP and LANDER), T., 740;
 P., 1895, 146.
 silver and barium salts (JAPP and
 LANDER), T., 740; P., 1895, 146.
 ethylic and *iso* butylic (?) salts of,
 reduction of (JAPP and LANDER),
 T., 743; P., 1895, 146.
- iso*-Butylbenzene, magnetic rotatory
 power, &c., of (PERKIN), T., 1082,
 1083, 1192, 1241.
- ab-iso*-Butylcarboxyethylthiocarbamide
 (DORAN), T., 331; P., 1896, 75.
- Butylchloramine (BERG), A., i, 9.
- Butyldichloramine (BERG), A., i, 9.
- iso*-Butyldibydroisindole, base derived
 from, and its platinochloride (BROM-
 BERG), A., i, 580.
- m-iso*-Butyldihydrotoluene. See
 Methylisobutylcyclohexadiene.
- iso*-Butylene, formation of (HOOKER),
 T., 1356.
 action of acetic chloride on (KONDA-
 KOFF), A., i, 462.
 oxidation of, by palladinised copper
 oxide (CAMPBELL), A., ii, 171.
- iso*-Butylic alcohol, action of light on
 (RICHARDSON and FORTY), T.,
 1352; P., 1896, 164.
 nitro- (HENRY), A., i, 4
- iso*-Butylideneacetoacetic acid, ethylic
 salt of (KNOEVENAGEL), A., i, 210.
- iso*-Butylidenebisacetonedicarboxylic

- acid, ethylic salt of (KNOEVENAGEL), A., i, 212.
- iso*-Butylidenecyanacetic acid (BRAUN), A., i, 594.
- iso*-Butylidenecyanacetonitrile, action of bromine on (BRAUN), A., i, 594.
- hydrolysis of (BRAUN), A., i, 594.
- iso*-Butylidenephthalide (BROMBERG), A., i, 580.
- Butylmalonic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- iso*-Butylmalonic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- hydrolysis of (HJELT), A., i, 205, 598.
- action of ethylenic bromide on (BISCHOFF), A., i, 129.
- iso*-Butylmalonic acid, sodio-, ethylic salt, action of ethylic α -bromopropionate, α -bromobutyrate, α -bromoisobutyrate, and α -bromisovalerate on (BISCHOFF), A., i, 467.
- Butylmalonic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- butyloxamic acid, butylamine salt (BERG), A., i, 8.
- iso*-Butylphthalazine, chloro-, and its picrate and platinochloride (BROMBERG), A., i, 580.
- iso*-Butylphthalazone (BROMBERG), A., i, 580.
- iso*-Butyltetrahydro-*m*-cresol. See 1:3-Methylisobutylcyclohexenol-5.
- iso*-Butylthiocarbimide, action of hydrogen sulphide on (PONZIO), A., i, 636.
- iso*-Butyltoluene, 5-chloro- (GUNDLICH and KNOEVENAGEL), A., i, 212.
- butyramide, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- butyric acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- and water, distillation of a mixture of (SOREL), A., i, 463.
- butyric acid, potassium salt, products of electrolysis of (HAMONET), A., i, 664.
- dipropylacetylenic salt, density of (ANDERLINI), A., i, 203.
- ethylic salt, molecular volume in organic solvents of (NICOL), T., 143; P., 1895, 237.
- methylic salt, heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
- phenylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1075, 1076, 1078, 1180, 1238.
- estimation of (WILCOX), P., 1895, 202.
- Butyric acid, β -amino- (WEIDEL and ROITHNER), A., i, 470.
- α -bromo-, action of hydroxylamine on (HANTZSCH and WILD), A., i, 285.
- $\alpha\alpha\beta$ -tribromo- (VALENTIN), A., i, 79.
- β -chloro-, ethylic salt of (WEIDEL and ROITHNER), A., i, 470.
- $\alpha\alpha\beta$ -trichloro-, formation of, from α -chlorocrotonic acids (VALENTIN), A., i, 79.
- $\alpha\beta\beta$ -trichloro- (M.P. 51.5—52°) (SZENIC and TAGGESELL), A., i, 81.
- α -oxime of (HANTZSCH and WILD), A., i, 285.
- peroxide of, and its ethylic salt (JOVITSCHITSCH), A., i, 82.
- syn*-dioximido- (JOVITSCHITSCH), A., i, 82.
- Butyric chloride, action of zinc methide on (IPATIEFF), A., i, 402.
- iso*-Butyric acid, melting and solidifying points of (MASSOL), A., i, 408.
- action of uranium salts on (FAY), A., i, 465.
- hydrazine derivatives of (THIELE and HEUSER), A., i, 340, 341.
- calcium salt, action of heat on (GLÜCKSMANN), A., i, 333.
- potassium salt, products of electrolysis of (HAMONET), A., i, 664.
- crotonylic salt (CHARON), A., i, 662.
- methylic salt, heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
- iso*-Butyric acid, bromo-, action of finely divided silver on (HELL), A., i, 10.
- α -bromo-, ethylic salt, action of finely divided silver on (AUWERS and ZIEGLER), A., i, 643.
- hydroxylamino- (MÜNCH), A., i, 203.
- iso*-Butyric chloride, action of mercuric or lead thiocyanate on (DIXON), T., 862; P., 1896, 100.
- Butyrolin. See Propyl- α -hydroxybutyl ketone.
- Butyrolactone (BENTLEY, HAWORTH, and PERKIN), T., 168; P., 1896, 36; (FICHTER and HERBRAND), A., i, 463.
- dioxime (WOLFF and SCHWABE), A., i, 524.
- Butyronitrile, preparation of (HOFMANN LECTURE), T., 696.
- iso*-Butyronitrile, hydroxylamino- (MÜNCH), A., i, 203.
- Butyrophenone-*o*-carboxylic acid (BROMBERG), A., i, 579.
- Butyrylnalic acid, rotatory power of the methylic, ethylic, propylic, and

- isobutylic* salts of (WALDEN), A., ii, 136.
- Butyrylmalonic acid, specific rotation of the ethylic salt of (PURDIE and WILLIAMSON), T., 825.
- bromo-, ethylic salt, rotatory power of the (WALDEN), A., ii, 136.
- iso*-Butyrylmalic acid, rotatory power of the methylic and ethylic salts of (WALDEN), A., ii, 136.
- 4:1-*iso*-Butyrylmethylcyclopentan-3-one (*iso*-Butyrylmethylketopentamethylene), dioxime, copper derivative, ammonia and bisulphite compounds (VON BAEYER), A., i, 247.
- ab-iso*-Butyryl- α -naphthylthiocarbamide (DIXON), T., 865; P., 1896, 101.
- Butyrylphenylsemicarbazide (WIDMAN), A., i, 630.
- iso*-Butyrylphenylsemicarbazide (WIDMAN), A., i, 630.
- ab-iso*-Butyrylphenylthiocarbamide (DIXON), T., 862; P., 1896, 101.
- action of silver nitrate on (DIXON), T., 863; P., 1896, 101.
- ab-iso*-Butyrylphenylurea (DIXON), T., 863; P., 1896, 101.
- iso*-Butyrylthiocarbimide (DIXON), T., 862.
- action of aniline, *o*- and *p*-toluidine, and α -naphthylamine on (DIXON), T., 862—865.
- ab-iso*-Butyryl-*o*-tolylthiocarbamide and action of silver nitrate on (DIXON), T., 863; P., 1896, 101.
- ab-iso*-Butyryl-*p*-tolylthiocarbamide and action of silver nitrate on (DIXON), T., 864; P., 1896, 101.
- ab-iso*-Butyryl-*o*-tolylurea (DIXON), T., 863; P., 1896, 101.
- ab-iso*-Butyryl-*p*-tolylurea (DIXON), T., 864; P., 1896, 101.
- Buzylene derivatives (CURTIUS), A., i, 339.
- Bynecdestin, preparation of (OSBORNE and CAMPBELL), A., i, 714.
- Bynin from malt (OSBORNE and CAMPBELL), A., i, 715.

C.

- Cabbage, potato-, dye of bluish-skinned (WEIGERT), A., i, 388.
- Cacao butter, iodine number of (FISCHER), A., ii, 680.
- iodine number and refractive index of (STROHL), A., ii, 506.
- Cacoxenite from Bavaria (WEINSCHENK), A., ii, 310.
- Cactaceæ, alkaloids of (EWELL), A., i, 710.
- Caetus, alkaloids of (HEFFTER), A., i, 268.
- Cadmium, action of, on a photographic plate (COLSON), A., ii, 601.
- vapour density of (BILZ), A., ii, 152.
- solution and diffusion in mercury of (HUMPHREYS), T., 1680; P., 1896, 220.
- physiological action of (PADERI), A., ii, 491.
- Cadmium-alloys with lead and with zinc, solution and diffusion in mercury of (HUMPHREYS), T., 1681; P., 1896, 220.
- with silver, melting points of (GAUTIER), A., ii, 646.
- Cadmium amalgam, thermoelectromotive force of solutions of cadmium salts and (HAGENBACH), A., ii, 513.
- Cadmium salts, physiological action of (ATHANASIU and LANGLOIS), A., ii, 319.
- bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.
- chloride, fused, electrolysis of (LORENZ), A., ii, 23.
- chromate and dichromate (SCHULZE), A., ii, 24, 25.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
- niobate (LARSSON), A., ii, 564.
- sulphate, energy and electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
- cæsium sulphate, density and optical behaviour of (TUTTON), T., 451.
- rubidium sulphate, density and optical behaviour of (TUTTON), T., 445.
- sulphide, electrochemical preparation of (LORENZ), A., ii, 648.
- physical change produced by gently heating (SPRING), A., ii, 290.
- effect of high temperature on amorphous (MOURLOT), A., ii, 603.
- thiopyrophosphate (FERRAND), A., ii, 473.
- Cadmium, separation of copper from (MAWROW and MUTHMANN), A., ii, 338.
- separation electrolytically from mercury (SMITH and WALLACE), A., ii, 220.

- Cæsium chlorate, electrolytic conductivity of solutions of (BAUR), A., ii, 144.
- chromic chlorides (WELLS and BOLTWOOD), A., ii, 107.
- uranyl chloride (WELLS and BOLTWOOD), A., ii, 108.
- ferrate (MOESER), A., ii, 251.
- zirconium fluorides (WELLS and FOOTE), A., ii, 179.
- perthiomolybdate (HOFMANN), A., ii, 476.
- sulphate, constitution of double salts containing (TUTTON), T., 519; P., 1896, 71.
- cadmium sulphate, density and optical behaviour of (TUTTON), T., 451.
- cobalt sulphate, density and optical behaviour of (TUTTON), T., 428.
- copper sulphate, density and optical behaviour of (TUTTON), T., 441.
- ferrous sulphate, density and optical behaviour of (TUTTON), T., 396.
- magnesium sulphate, density and optical behaviour of (TUTTON), T., 366.
- manganous sulphate, density and optical behaviour of (TUTTON), T., 403.
- nickel sulphate, density and optical behaviour of (TUTTON), T., 415.
- titanium alum (PICCINI), A., ii, 365.
- vanadium alum (PICCINI), A., ii, 305.
- zinc sulphate, density and optical behaviour of (TUTTON), T., 383.
- Caffeine, synthesis of (FISCHER and ACH), A., i, 263.
- periodide, analogy of, to theobromine periodide (SHAW), T., 103; P., 1895, 177.
- physiological action of (ALBANESE), A., ii, 319, 492.
- effect of, on the germination of seeds (MOSSO), A., ii, 326.
- estimation of, in tea (PETIT and TERRAT), A., ii, 629.
- estimation of, in presence of theobromine (DENIGÈS), A., ii, 387.
- Caffeine, chloro-, action of potash on (FISCHER), A., i, 13.
- Calamine from Spain (CESÀRO), A., ii, 479.
- Calaverite from Cripple Creek, Colorado (HILLEBRAND), A., ii, 31; (KNIGHT), A., ii, 614.
- Calcareous tufa from Bungonia, N.S.W. (CURRAN), A., ii, 535.
- Calcistronite from Westphalia (LAPPEYBES and KAISER), A., ii, 660.
- Calcite, etching of (HAMBERG), A., ii, 366.
- Calcite, action of magnesium solutions on (KLEMENT), A., ii, 116.
- (*hislopite*), enclosures in (HOLLAND), A., ii, 261.
- Calcium salts, influence of, on blood coagulation (HORNE), A., ii, 437.
- elimination of, in cases of rickets (DE KONINCK), A., ii, 50.
- absorption and excretion of (REX), A., ii, 489.
- bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.
- oxybromide, thermochemical data of (TASSILLY), A., ii, 465.
- carbonate, welding of, under prolonged pressure (SPRING), A., ii, 300.
- action of sodium sulphate and carbonic anhydride on (TANATAR), A., ii, 419.
- effect of, on germination (CLAUDEL and CROCHETELLE), A., ii, 442.
- See also Aragonite, Calcite, Limestone, and Agricultural chemistry (Appendix).
- chloride, freezing points of aqueous solutions of (PONSOT), A., ii, 412.
- hexahydrated, absorption of moisture by (HAKE), P., 1896, 34.
- chromite (DUBAU), A., ii, 167.
- imidosulphonates (DIVERS and HAGA), T., 1625; P., 1896, 179.
- mercury imidosulphonate (DIVERS and HAGA), T., 1630; P., 1896, 179.
- iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
- hydrated, thermochemical data of (TASSILLY), A., ii, 350.
- niobate (LARSSON), A., ii, 564.
- nitrate, vapour pressures of concentrated solutions of (WADDELL), A., ii, 151.
- oxide (*lime*), crystallised (BRÜGELMANN), A., ii, 167.
- action of dry hydrochloric acid on (VELEY), A., ii, 360.
- effect of, on germination (CLAUDEL and CROCHETELLE), A., ii, 442.
- estimation of, photometrically (HINDS), A., ii, 574.
- estimation of, by potash soap (SZYFFER), A., ii, 499.
- See also Agricultural chemistry.
- phosphate, crystalline, from basic slag (CARNOT), A., ii, 522.
- and phosphorus, influence of, on the nutrition of plants (STOKLASA), A., ii, 266.

Calcium superphosphate from Algeria (MALBOT), A., ii, 185.
 phosphates. See also Agricultural chemistry.
 silicophosphate, crystalline, from basic slag (CARNOT), A., ii, 522.
 metaplumbate (KASSNER), A., ii, 247; (GRÜTZNER), A., ii, 248.
 orthoplumbate (KASSNER), A., ii, 247.
 diplumbate (KASSNER), A., ii, 247.
 tetraplumbate (KASSNER), A., ii, 248.
 silicide (DE CHALMOT), A., ii, 473.
 zirconate (VENABLE and CLARKE), A., ii, 653.

Calcium cyanate, preparation of (FAURE), A., i, 113.
 ferrocyanide, action of nitrous acid on (MARIE and MARQUIS), A., i, 403.

Calcium, detection of traces of, in strontium salts (SÖRENSEN), A., ii, 361.
 estimation of, by alkalis volumetrically (RUOSS), A., ii, 500.
 separation of strontium and barium from (DUPASQUIER), A., ii, 450.

Callitrolic acid: its salts and acetyl derivative (BALZER), A., i, 494.

Calorimeter. See Heat.

Camphanic acid from *w*-bromocamphoric acid (KIPPING), T., 65; P., 1895, 213.
 from chlorocamphoric anhydride (MARSH and GARDNER), T., 82.
 distillation of (ASCHAN), A., i, 447.
 π -bromo- (KIPPING), P., 1895, 212.

π -Camphanic acid, lactoanhydride (KIPPING), T., 942.

cis- π -Camphanic acid, circular polarisation of, in the crystalline state (POPE), T., 974; P., 1896, 116.
 crystallography and pyroelectric properties of (POPE), T., 973; P., 1896, 116.
 methylic salt, anhydride (KIPPING), T., 943; P., 1896, 115.

trans- π -Camphanic acid, oxidation of (KIPPING), T., 960; P., 1896, 115.
 silver, ammonium salts, anhydride, amide (KIPPING), T., 929; P., 1895, 33, 88, 211; 1896, 114.

Camphene, constitution of (MARSH and GARDNER), T., 90; (TILDEN), T., 1014.
 from pinene (TILDEN and NICHOLLS), P., 1896, 138.
 oxidation of (MARSH and GARDNER), T., 74; P., 1895, 206.
 salt of isoborneol from (REYCHLER), A., i, 308.
 bromide (REYCHLER), A., i, 381.

Camphene, hydrochloride, behaviour towards acetic acid and bromine (JÜNGER and KLAGES), A., i, 313.

Camphene, α -dichloro- (KIPPING and POPE), P., 1895, 57; (LAPWORTH and KIPPING), T., 1559; P., 1896, 152, 188.

Camphenephosphonic acid, chloro-, oxidation of (MARSH and GARDNER), T., 75.

Camphenesulphonic acid, α -chloro-, potassium and sodium salts, chloride, amide, anilide (KIPPING and POPE), P., 1895, 57; (LAPWORTH and KIPPING), T., 1551; P., 1896, 152, 188.
 β -chloro-, potassium, sodium, barium salts, lactone, chloride, amide, anilide (KIPPING and POPE), P., 1895, 57; (LAPWORTH and KIPPING), T., 1560; P., 1896, 152, 188.

Camphenone, bromo-, constitution of (ANGELO and RIMINT), A., i, 248.

Camphenylic acid from oxidation product of French turpentine (WAGNER and ERTSCHIKOWSKY), A., i, 380.

Camphoic acid and its monammonium, triammonium, copper, and triplumbic salts (MARSH and GARDNER), T., 75; P., 1895, 206.

Campholene hydriodide (GUERBET), A., i, 57.
 nitrosochloride (GUERBET), A., i, 57.

Campholenic acid, nitro- (BÉHAL and BLAISE), A., i, 56.

i-Campholenic acid, behaviour of, towards bromine (GUERBET and BÉHAL), A., i, 652.
 action of nitric peroxide on (BÉHAL and BLAISE), A., i, 55.
 oxidation of (BÉHAL), A., i, 55, 179.

Campholenolide, ceruleonitroso- (BÉHAL and BLAISE), A., i, 56.
 leuconitroso- (BÉHAL and BLAISE), A., i, 56.

Campholic acid (GUERBET), A., i, 56.
 cyano-, from campholide (HALLER), A., i, 385.
 behaviour of, towards potassium bromide (HALLER), A., i, 448.

Campholide (HALLER), A., i, 385.
 hydrolysis of (FORSTER), T., 55; P., 1895, 209.
 α -bromo-, hydrolysis of (FORSTER), T., 50; P., 1895, 209.
 β -bromo- (FORSTER), T., 54; P., 1895, 209.
d-bromo-, and its hydrolysis (FORSTER), T., 41; P., 1895, 208.

allo-Campholytic acid, ethylic salt (WALKER and HENDERSON), T., 749.

- is-Campholytic acid, nature of (NOYES), A., i, 696.
- Camphopyranilic acid (MARSH and GARDNER), T., 83; P., 1895, 206.
- is-Camphopyric acid and its lead and sodium salts and chloride (MARSH and GARDNER), T., 77; P., 1895, 206.
- meso-Camphopyric acid (MARSH and GARDNER), T., 79.
- rans-Camphopyric acid (MARSH and GARDNER), T., 80; P., 1895, 206.
- Camphopyric anhydride (MARSH and GARDNER), T., 77; P., 1895, 206.
- chloro- (MARSH and GARDNER), T., 83; P., 1895, 206.
- Camphopyric chloride (MARSH and GARDNER), T., 78; P., 1895, 206.
- chloro- (MARSH and GARDNER), T., 80; P., 1895, 206.
- Camphoramic acid, silver and copper salts (HOOGWERFF and VAN DORP), A., i, 314.
- Camphoramic acid (HOOGWERFF and VAN DORP), A., i, 314.
- Camphor, constitution of (MARSH and GARDNER), T., 90; (ASCHAN), A., i, 492.
- from *d*-camphoric acid (HALLER), A., i, 448.
- from homocamphoric acid (BREDT and VON ROSENBERG), A., i, 178.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- Camphor, amino-, from π -bromo- α -nitrocamphor and its hydrochloride and platinochloride (LAPWORTH and KIPPING), T., 315; P., 1895, 210.
- bromo-, constitution of (ANGELO and RIMINI), A., i, 248.
- π -bromo-, from $\alpha\pi$ -dibromocamphor, oxime of (REVIS and KIPPING), P., 1896, 77.
- α -dibromo-, behaviour of, towards nitric acid (FORSTER), T., 36; P., 1895, 207.
- $\alpha\pi$ -dibromo-, oxidation of (KIPPING), T., 915; P., 1895, 210; 1896, 114.
- π -brom- α -amino-, hydrochloride, oxalate, platinochloride, and acetyl derivative (LAPWORTH and KIPPING), T., 316; P., 1895, 210.
- π -bromo- α -nitro-, three modifications of, and the potassium, ammonium, sodium, barium, calcium, copper, manganese, zinc, nickel, cobalt, bismuth, lead, derivatives (LAPWORTH and KIPPING), T., 309; P., 1895, 210.
- Camphor, $\alpha\pi$ -dibromo- α -nitro- (LAPWORTH and KIPPING), T., 308; P., 1895, 209.
- π -bromo- α -isonitro-, and its potassium, barium, calcium, cobalt, nickel, copper, mercuric, bismuth, and acetyl derivatives (LAPWORTH and KIPPING), T., 317; P., 1895, 210.
- π -chloro-, oxidation of (KIPPING and POPE), P., 1895, 213.
- α -chloronitro- conversion of, into camphorquinone (LAPWORTH), T., 322; P., 1896, 76.
- α -nitro-, rotatory power of, in different solvents (PESCIETTA), A., ii, 346.
- sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- Camphor. See also Anise-camphor, Matico-camphor, and Patchouli-camphor.
- Camphorenic acid, sodium, zinc, and methylic salts (FORSTER), T., 52; P., 1895, 208.
- bromo-, barium, silver, zinc, ammonium, copper, methylic salts, and oxidation of (FORSTER), T., 46; P., 1895, 208.
- Camphorenic anhydride (FORSTER), T., 52; P., 1895, 208.
- Camphoric acid, constitution of (MARSH and GARDNER), T., 90; (WALKER and HENDERSON), T., 957; P., 1896, 110; (NOYES), A., i, 695.
- from camphene (MARSH and GARDNER), T., 84; P., 1895, 206.
- from campholide (HALLER), A., i, 385.
- compound of, with acetone (POPE), T., 1696; P., 1896, 217.
- compounds of, with rhodinol and geraniol (ERDMANN and HUTH), A., i, 198.
- potassium allo-ethylic salt, electrolysis of (WALKER and HENDERSON), T., 748; P., 1896, 110.
- Camphoric acid, bromo-, from cyano-campholic acid (HALLER), A., i, 448.
- π -bromo- (KIPPING), T., 924; P., 1895, 34, 210; 1896, 114.
- methylic salt (KIPPING), T., 924; P., 1895, 34, 210; 1896, 114.
- ω -bromo- (KIPPING), T., 63; P., 1895, 212.
- π -chloro- (KIPPING and POPE), P., 1895, 213.
- d*-Camphoric acid, from π -bromocamphoric acid (KIPPING), T., 928.
- Camphoric acids, constitution and properties of (ASCHAN), A., i, 492.

- Camphoric anhydride, behaviour of, towards benzene in presence of aluminium chloride (BURKER), A., i, 179.
 reduction of (HALLER), A., i, 385.
 bromo-, behaviour of, with bases (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.
 π -bromo- (KIPPING), T., 927; P., 1896, 114.
 α -bromo- (KIPPING), P., 1895, 212.
 π -dibromo- (KIPPING), P., 1895, 212.
 chloro- (MARSH and GARDNER), T., 82.
 Camphoric chloride, chloro- (MARSH and GARDNER), T., 81.
iso-Camphoric acids, constitution of (ASCHAN), A., i, 493.
 Camphoric mononitrile: its anhydride and anilide (HALLER and MINGUIN), A., i, 695.
 Camphoric peroxide (VANINO and THIELE), A., i, 597.
 Camphorimide from cyanolantronic acid (HOOGWERFF and VAN DORP), A., i, 314.
 α -Camphorisoimide hydrochloride and anurochloride (HOOGWERFF and VAN DORP), A., i, 314.
 β -Camphorisoimide hydrochloride and anurochloride (HOOGWERFF and VAN DORP), A., i, 314.
 β -Camphormethylisoimide, hydrochloride and anurochloride (HOOGWERFF and VAN DORP), A., i, 315.
 Camphoronamic acid, ammonium ethylic salt of (HESS), A., i, 102.
 Camphorone, behaviour of, towards phosphoric anhydride (KERP), A., i, 448.
 reduction of (KERP), A., i, 448.
 Camphoronic acid (BREDT, ARNTZ, and HELLE), A., i, 653.
 diethylic and triethylic salts (HESS), A., i, 102.
 triethylic salt, velocity of hydrolysis of (HJELT), A., i, 600.
iso-Camphoronic acid from oxidation of pinonic and α -pinonic acids (TIEMANN and SEMMLER), A., i, 309.
 Camphoronimic acid and its ammonium salt and amide (HESS), A., i, 102.
 Camphoroxime, behaviour of, towards methylic iodide (FORSTER), P., 1896, 146.
 hydrobromide, methyl and acetyl derivatives of (FORSTER), P., 1896, 146.
 Camphorpinacone, isomeride of (BECKMANN), A., i, 652.
 Campherquinone, from α -chloronitro-
 camphor (LAPWORTH), T., 323; P., 1896, 76.
 Camphorsulphonic acid, α -bromo-, oxidation of ammonium salt (LAPWORTH and KIPPING), P., 1896, 77.
cis-Camphotricarboxylic acid, and its silver salt, and anhydride (KIPPING), T., 966; P., 1896, 115.
trans-Camphotricarboxylic acid, hydrated, crystallography and circular polarisation of (POPE), T., 978; P., 1896, 116.
 and its silver, calcium salts, and anhydride (KIPPING), T., 951; P., 1896, 115.
 Camphydrene, chloro-. See Pinene hydrochloride.
 Canadine, physiological action of (VON BUNGE), A., ii, 492.
 Cancrinite, formula of (RAMMELSBERG), A., ii, 190.
 Cane-sugar. See Sugar.
 Cannabin, preparation of cannabinol from (WOOD, SPIVEY, and EASTERFIELD), T., 546; P., 1896, 76.
 Cannabinol, active constituent of Indian hemp (WOOD, SPIVEY, and EASTERFIELD), T., 544; P., 1896, 76.
 existence of, in pharmaceutical preparation (WOOD, SPIVEY, and EASTERFIELD), T., 545; P., 1896, 76.
 acetyl and benzoyl derivatives of (WOOD, SPIVEY, and EASTERFIELD), T., 545; P., 1896, 76.
 Cannabinone, preparation of cannabinol from (WOOD, SPIVEY, and EASTERFIELD), T., 546; P., 1896, 76.
Cannabis indica, constituents of (WOOD, SPIVEY, and EASTERFIELD), T., 539; P., 1896, 76.
sativa, edestin, the proteid in (OSBORNE and CAMPBELL), A., i, 716.
 Capric acid. See Decoic acid.
iso-Caprolactone. See Hydroxy*iso*-hexoic acid, lactone of.
 Caprylic acid. See Octoic acid.
 Capsicum seeds, oil from (VON BITTÓ), A., ii, 209.
 Capsicum seed mucilage (VON BITTÓ), A., ii, 209.
 Caramel, polarisation and analysis of (HERON), A., ii, 394.
 Carbamic acid, nitroso-, potassium salt (THIELE and LACHMANN), A., i, 208.
 Carbamic azoimide (CURTIUS and HEIDENREICH), A., i, 143.
 Carbamide, synthesis of, from gnaiacol carbonate (CAZENEUVE), A., i, 528.

- Carbamide, heat of solution in water and ethylic alcohol of (SPEYERS), A., ii, 411.
- freezing points of dilute solutions of (ABEGG), A., ii, 588.
- action of acetylurethane on (OSTROGOVICH), A., i, 530.
- action of β -amidopropionic acid on (WEIDEL and ROITHNER), A., i, 470.
- action of benzaldehyde on (SCHIFF), A., i, 529.
- action of carbonyl dichloride on (SCHIFF), A., i, 530.
- action of α -ethylaminopropionic acid on (DUVILLIER), A., i, 89.
- action of ethylic chlorcarbonate on (SCHIFF), A., i, 530.
- action of hypobromites on, in presence of a cyanate (ALLEN), P., 1896, 31.
- action of phthalic anhydride on (DUNLAP), A., i, 471.
- carbamide, nitro- (THIELE and LACHMANN), A., i, 207.
- thermochemical data of (TANATAR), A., ii, 466.
- nitroso- (THIELE and LACHMANN), A., i, 208.
- carbamides, alkyl substituted, rate of formation of, from the corresponding cyanates (WALKER and APPLEYARD), T., 193; P., 1896, 12.
- carbanilide. See *s*-Diphenylcarbamide.
- carbanite. See Phenylcarbimide.
- carbazoimide (*carbonyl nitride*) (CURTIUS), A., i, 340.
- analogy of reactions with carbonyl chloride (CURTIUS and HEIDENREICH), A., i, 143.
- carbazole, discovery of (HOFMANN LECTURE), T., 631.
- synthesis of (GRAEBE and ULLMANN), A., i, 575.
- di*- and *tribromo*-, acetyl and benzoyl derivatives of (MAZZARA), A., i, 393.
- pentabromo*- (MAZZARA and LEONARDI), A., i, 393.
- heptabromo*- (MAZZARA and LEONARDI), A., i, 393.
- chlorobromo*-, and its acetyl and benzoyl derivatives (LAMBERTI-ZANARDI), A., i, 304.
- α - and β -*dichlorodibromo*-, benzoyl derivatives of (LAMBERTI-ZANARDI), A., i, 305.
- chloronitro*-, and its acetyl and benzoyl derivatives (LAMBERTI and ZANARDI), A., i, 651.
- nitramino*- (MAZZARA and LEONARDI), A., i, 392.
- Carbethoxyacetohydroxamic acid, derivatives of (NEF and JONES), A., i, 460.
- γ -Carbodiphenylimide (SCHALL), A., i, 223, 305.
- Carbohydrate from mucin (CHITTENDEN and GIES), A., i, 456.
- Carbohydrates, hydrolysing action of glyoxylic acid on (BOETTINGER), A., i, 5, 6.
- action of dilute alkalis on (DE BRUYN), A., i, 116.
- of barley straw (CROSS, BEVAN, and SMITH), T., 1604; P., 1896, 174.
- relation of furfuroids to total, from barley straw (CROSS, BEVAN, and SMITH), T., 1606; P., 1896, 174.
- formation of proteids and, in plants (SAPOSCHNIKOFF), A., ii, 537.
- Carbohydrates. See also:—
- Achroodextrin.
 - Adonitol.
 - Amylodextrin.
 - Araban.
 - Arabinose.
 - Arabitol.
 - Cane-sugar.
 - Capsicum seed mucilage.
 - Cellulose.
 - Dextrin.
 - Dextrose (glucose).
 - Digluucose.
 - Dulcitol and *iso*-Dulcitol.
 - Erythrodextrin.
 - Fructose (levulose).
 - Galactan.
 - Galactose.
 - α - and β -Galaheptose.
 - Galaoctose.
 - Glucoheptitol.
 - Glucose (dextrose).
 - Glycerose.
 - Glycogen.
 - Inulin.
 - Inulin of garlic.
 - Jecorin.
 - Lactose.
 - Levulose (fructose).
 - Lyxose.
 - Maltodextrin.
 - Maltose and *iso*-Maltose.
 - Mannan.
 - Mannitol.
 - Mannose.
 - Metamaltose.
 - Methyltetrose.
 - Mucilage.
 - Oxycellulose.
 - Pectins and pectin substances.
 - Pentosans.
 - Polysaccharides.

Carbohydrates. See:—

Raffinose.
 Rhamnose and *iso*-Rhamnose.
 Sorbitol.
 Starch.
 Volemitol.
 Xylan.
 Xylose.

Carbohydrazide (carbazine) (CURTIUS and HEIDENREICH), A., i, 143.

hydrochloride and sulphate (CURTIUS and HEIDENREICH), A., i, 143.

diacetyl derivative of (CURTIUS and HEIDENREICH), A., i, 143.

Carbohydrazimine (CURTIUS), A., i, 39.

Carbolic acid. See Phenol.

Carbolic powders, estimation of sulphurous anhydride in (DE KONINGH), A., ii, 275.

Carbon in meteorites (MOISSAN), A., ii, 194.

atomic weight of (WANKLYN), A., ii, 165.

atom, asymmetric (FITZGERALD), T., 892; P., 1896, 25.

Diamond, artificial (MOISSAN), A., ii, 644.

obtained from steel (ROSSEL), A., ii, 601.

black (MOISSAN), A., ii, 645.

phosphorescence of (KUNZ), A., ii, 306.

Graphite from a pegmatite (MOISSAN), A., ii, 182.

varieties of (MOISSAN), A., ii, 165.

specific heat of (VIOLE), A., ii, 8.

boiling point of (VIOLE), A., ii, 8.

compounds containing, bivalent (NEF), A., i, 71.

direct union of, with hydrogen (BONE and JEORDAN), P., 1896, 61.

Carbides, metallic, classification of (MOISSAN), A., i, 633.

action of water on (MOISSAN), A., i, 633.

Carbon tetrachloride, action of potassium bromide and iodide on (SNAPE), A., ii, 641.

action of zinc and sulphuric acid on (ANONYMOUS), A., i, 633.

Nitrographitic acid from spiegeleisen (DONATH), A., ii, 563.

Carbonic oxide, evolution of, by alkaline pyrogallol during oxygen estimations (CLOWES), P., 1895, 200.

spectrum of the flame of (BOHN), A., ii, 140.

behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.

Carbon.

Carbonic oxide, duration of the flame in the explosive combustion of moist and dry (DIXON, STRANGE, and GRAHAM), T., 773; P., 1896, 55.

combination of oxygen with (DIXON), T., 774; P., 1896, 55.

explosive mixtures of air and (CLOWES), P., 1895, 201.

oxidation of, by palladinised copper oxide (CAMPBELL), A., ii, 171.

combination of, with nitrous oxide (DIXON), T., 780; P., 1896, 56.

action of, on man (HALDANE), A., ii, 52.

absorption coefficient of (HÜFNER), A., ii, 485.

excretion of nitrogen in poisoning by (MÜNZER and PALMA), A., ii, 662.

estimation of, in air (HALDANE), A., ii, 76.

estimation of, in blood (HALDANE), A., ii, 52.

compound of, with hæmoglobin. See Hæmoglobin.

Carbonic anhydride, mode of formation of, in the combustion of carbon compounds (DIXON), T., 774; P., 1896, 55.

effect of electric sparks on (HOFMANN LECTURE), T., 728.

behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.

solubility of, in sodium phosphate solution. L. Meyer's investigation on (BEDSON), T., 1413.

solubility of, in aniline (KONOWALOFF), A., ii, 351.

the source of carbon for nitrifying organisms (GODLEWSKI), A., ii, 669.

source of, in muscle (KRÜGER), A., ii, 487.

action of, on nerve (WALLER), A., ii, 52.

estimation of, apparatus for (HEIDENHAIN), A., ii, 337.

estimation of, new baryta tube for (GEELMUYDEN), A., ii, 674.

estimation of, volumetrically (SYMONS and STEPHENS), T., 869; P., 1896, 103.

estimation of, rapidly in the atmosphere (HENRIET), A., ii, 621.

estimation of, free and combined in waters (Vichy-Vals) (MEILLÈRE), A., ii, 341.

estimation of, in carbonates by iodine (PHELPS), A., ii, 673.

- Carbon.
- Carbonates, artificial crystallised (BOURGEOIS), A., ii, 110.
- detection of, in presence of sulphites and sulphates (GIACOMELLI), A., ii, 124.
- Carbonic acid, methylic and ethylic salts, heat of evaporation of (LOUGUININE), A., ii, 146.
- β -naphthyllic salt of, detection of (DRAGENDORFF), A., ii, 279.
- Carbonic acid, chloro-, action of phenylacetylthiocarbamide on (DORAN), T., 343.
- ethylic salt, action of, on formanilide (FREER and SHERMAN), A., i, 612.
- action of phenylthiocarbamide on (DORAN), T., 342.
- action of lead thiocyanate on (DORAN), T., 325; P., 1896, 74.
- imido-. See Imidocarbonic acid.
- Carbonyl chloride, action of, on the hydrides of non-metals (BESSON), A., ii, 358.
- action of, on phosphonium halogen compounds (BESSON), A., ii, 358.
- action of, on dithioacetylacetone (VAILLANT), A., i, 591.
- Carbon bisulphide, spectrum of the flame of (BOHN), A., ii, 140.
- magnetic rotatory power, &c., of (PERKIN), T., 1123.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- volume changes during the formation of solutions in (JONES), P., 1895, 179.
- influence of, on the combination of carbonic oxide and oxygen (DIXON), T., 783; P., 1896, 56.
- influence of, on nitrification (PAGNOUL), A., ii, 67; (PAGNOUL and DEHÉRAIN), A., ii, 329.
- effect of, on exhausted soils (OBERLIN), A., ii, 67.
- Carbon, estimation of, new apparatus for (WÜST), A., ii, 449.
- estimation of, in aluminium (MOISSAN), A., ii, 339.
- estimation of, in iron (PEIPERS), A., ii, 449.
- (graphite), estimation of, in pig-iron (SHIMER), A., ii, 499.
- estimation of, in steel (BLAIR), A., ii, 544.
- estimation of, in zinc (FUNK), A., ii, 274.
- Carbonado from Brazil (MOISSAN), A., ii, 182.
- Carbonamidohydrazoisobutyronitrile, hydrolysis of (THIELE and HEUSER), A., i, 340.
- Carbonyldiurea (SCHIFF), A., i, 530.
- Carbonyldicarbamide (SCHIFF), A., i, 530.
- Carbostyryl (2'-hydroxyquinoline), tautomerism of (CLAUS), A., i, 449.
- 4-amino- (CLAUS and SETZER), A., i, 498.
- 4-nitro- (CLAUS and SETZER), A., i, 498.
- Carboxyacetylthiosuccinic acid, ethylic salt of (EMERY), A., i, 414.
- α -Carboxy- β -acetylglutaric acid, ethylic salt (EMERY), A., i, 414.
- 4-Carboxyamidobenzoic acid, 3-amino-, and its salts (ZINCKE and HELMERT), A., i, 548, 549.
- Carboxyethylethylthionitric acid (NEF and JONES), A., i, 460.
- ab*-Carboxyethylethylthiocarbamide (DORAN), T., 330; P., 1896, 75.
- ab*-Carboxyethylmethylthiocarbamide (DORAN), T., 330; P., 1896, 75.
- Carboxyethylthiocarbamic acid, salts of, action of silver nitrate on (DORAN), T., 335.
- methylic, ethylic, propylic, isobutylic, and benzylic salts (DORAN), T., 334; P., 1896, 75.
- Carboxyethylthiocarbimide (DORAN), T., 326, 335.
- derivatives of, constitution of, and isomerism of (DORAN), T., 337.
- action of ammonia, amines, piperidine, and phenylhydrazine on (DORAN), T., 327—339; P., 1896, 74, 75.
- action of alcohols on (DORAN), T., 333; P., 1896, 75.
- action of water on (DORAN), T., 336.
- Carboxyethylthiourea (DORAN), T., 331; P., 1896, 75.
- Carboxyethyl- ψ -thiourea, hydrochloride of and hydrolysis of (DORAN), T., 341.
- Carboxyethyl- β -thiourethane. See Carboxyethylthiocarbamic acid, ethylic salt.
- Carboxyhæmoglobin. See Hæmoglobin.
- Carboxyl group, replacement of, by an amido-group (CURTIUS), A., i, 340.
- 2-Carboxyphenylmalonic acid, 6:4-dinitro-, ethylic salt of (JACKSON and ITTNER), A., i, 214.
- Cardene, a reduction product of cardol (SPIEGEL and DOBRIN), A., i, 653.
- Cardenic acid (SPIEGEL and DOBRIN), A., i, 653.
- Cardic acid (SPIEGEL and DOBRIN), A., i, 653.
- Cardol and derivatives, acetyl derivative of (SPIEGEL and DOBRIN), A., i, 653.

- Cardolic acid (SPIEGEL and DOBRIN), A., i, 653.
- Carnallite, ammonia in (ERDMANN), A., ii, 570. See also Agricultural chemistry.
- Carnanbic acid from wool fat (DARMSTAEDTER and LIFSCHÜTZ), A., i, 346.
- Carnic acid (SIEGFRIED), A., i, 660.
- Carniferrin (SIEGFRIED), A., i, 660.
- Caronebisnitrosylic acid, from bromotetrahydrocarvonebisnitrosylic acid (VON BAEYER), A., i, 246.
- Carotene, occurrence of (SCHRÖTTER-KRISTELLI), A., ii, 208.
- Carvacrol from nitrosopinene (MEAD and KREMERS), A., i, 54.
occurrence of, in oil of origanum (GILDEMEISTER), A., i, 55.
magnetic rotatory power, &c., of (PERKIN), T., 1132, 1183, 1239.
- Carvacrol, *p*-amino-: its hydrochloride and acetyl derivative (PLANCHER), A., i, 358.
nitramino- (SODERI), A., i, 359.
- Carvacrylic amylic ether (WELT), A., i, 333.
- Carvene, terpin hydrate from (REYCHLER), A., i, 308.
- i*-Carvone, from hydroxydihydrocarvoxime (WALLACH), A., i, 571.
- Carvoxime, hydrochloro-, active, from *d*-limonene nitrosochloride (VON BAEYER), A., i, 246.
inactive, from terpineol, pinene, and hydrochlorodipentene nitrosochlorides and nitrosopinene (VON BAEYER), A., i, 246.
- Caryinite from Långban, Sweden (SJÖGREN), A., ii, 112.
- Casein and its salts (RÖHMANN), A., i, 515.
constitution of (FLEURENT), A., i, 112.
difference between caseinogen and (HAMMARSTEN), A., i, 583.
behaviour of, with pepsin-hydrochloric acid (SALKOWSKI), A., i, 660.
decomposition products of, by boiling with hydrochloric acid (COHN), A., i, 658.
reactions of (EDMUNDS), A., ii, 489.
absorption of, from the small intestine (FRIEDLÄNDER), A., ii, 536.
as a food (MARCUSE), A., ii, 663.
estimation of, in cheese (STUTZER), A., ii, 684.
- Caseinogen, difference between casein and (HAMMARSTEN), A., i, 583.
- Cassiterite, formation of (GAUTIER), A., ii, 529.
- Cassiterite, artificial (ARZRUNI), A., ii, 307.
from New South Wales (LIVERSIDGE), A., ii, 658.
- Caswellite from New Jersey (CHESTER), A., ii, 309.
- Castor bean, edestin, a proteid in (OSBORNE and CAMPBELL), A., i, 716.
- Catalytic action of acids in accelerating chemical change (HARCOURT and ESSON), A., ii, 238.
of aniline hydrochloride on the change of diazoamino- into aminoazobenzene (GOLDSCHMIDT and REINDERS), A., ii, 515.
of hydrochloric acid on the rate of etherification (TAFEL), A., ii, 470.
of hydrogen ions (NOYES), A., ii, 470.
of nitrous acid (IHLE), A., ii, 460.
- Catechin, non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.
- Catechol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1130, 1135, 1184, 1240.
effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
in red grapes (SOSTEGNI), A., ii, 122.
- Catechol, dinitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1333.
5-nitro-3-amino- (MELDOLA, WOOLCOTT, and WRAY), T., 1334; P., 1896, 164.
- Catecholdiantipyrine (PATEIN and DUFAU), A., i, 188.
- Cattle. See Agricultural chemistry. (Appendix.)
- Cedar-wood oil, detection and estimation of, in santal-wood oil (PARRY), A., ii, 400.
- Cedrene (CHAPMAN and BURGESS), P., 1896, 140.
- Celestite from New South Wales (CARD), A., ii, 256.
- Cell-division, chemistry of (HEINE), A., ii, 489.
- Cell-membranes of cryptogams, constituents of (WINTERSTEIN), A., ii, 210.
- Cell-nucleus, bases from the (KOSSELL), A., i, 582.
- Cells, effect of want of oxygen on (LOEB), A., ii, 318.
wandering: of alimentary canal (HARDY and WESBROOK), A., ii, 42.
- Cellulose from various cryptogams, hydrolysis of (WINTERSTEIN), A., ii, 210.
composition of the soluble products of acid hydrolysis of (CROSS, BEVAN and SMITH), T., 810; P., 1896, 96.

- Cellulose, insoluble, obtained by acid hydrolysis, composition of (CROSS, BEVAN, and SMITH), T., 809; P., 1896, 96.
- ferment of (OMELIANSKI), A., ii, 203.
- digestion of, by enzymes (GRÜSS), A., ii, 669.
- sulphite, action of sulphuric and oxalic acids on (SIMONSEN), A., i, 331.
- estimation of (LANGE), A., ii, 278.
- separation of wheat straw into insoluble cellulose and soluble products (CROSS, BEVAN, and SMITH), T., 807; P., 1896, 96.
- separation of, from furfuroids by acid hydrolysis (CROSS, BEVAN, and SMITH), T., 806; P., 1896, 96.
- Cellulose. See also Oxycellulose, and Agricultural chemistry. (Appendix.)
- Celluloses of barley straw: their reactions (CROSS, BEVAN, and SMITH), T., 1609; P., 1896, 175.
- cereal, constitution of the (CROSS, BEVAN, and SMITH), T., 804; P., 1896, 95.
- acid hydrolysis of, and separation of the constituent groups (CROSS, BEVAN, and SMITH), T., 804; P., 1896, 96.
- Cements, hydraulic (REBUFFAT), A., ii, 360.
- examination of (STANGER and BLOUNT), A., ii, 392.
- molecular composition of (ODDO and MANZELLA), A., ii, 246.
- setting of (ODDO and MANZELLA), A., ii, 246.
- Cephaeline, non-existence of, in one sample of ipecacuanha root, (CRIPPS), A., i, 396.
- and its salts, preparation and properties of (PAUL and COWNLEY), A., i, 192.
- action of heat on (PAUL and COWNLEY), A., i, 395.
- estimation of, in ipecacuanha (CRIPPS), A., ii, 284.
- Cereals. See Agricultural chemistry.
- Cerebrin (THUDICHUM), A., i, 400.
- Cerium carbide (MOISSAN), A., ii, 422.
- molybdate (HITCHCOCK), A., ii, 526.
- oxide, new source of (PHIPSON), A., ii, 422.
- tungstate (HITCHCOCK), A., ii, 526.
- separation of thorium from (FRESSENIUS and HINTZ), A., ii, 677.
- Cerotic acid from beeswax (MARIE), A., i, 347.
- glycerylic salts of (MARIE), A., i, 347.
- methylic and ethylic salts of (MARIE), A., i, 347.
- Cerussite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- coated with galena from Montana (HOBBS), A., ii, 33.
- Cetyl. See Hexadecyl.
- Chabazite from Thuringia (FROMME), A., ii, 370.
- dehydration of, absorption of ammonia by (FRIEDEL), A., ii, 481.
- Chalk, welding of, under prolonged pressure (SPRING), A., ii, 300.
- Charas, constituents of (WOOD, SPIVEY, and EASTERFIELD), T., 539; P., 1896, 76.
- Charcoal, production of, from various woods (BARILLOT), A., i., 403.
- Cheese. See Agricultural chemistry.
- Cheiranthus cheiri*, quercetin, the yellow colouring matter of (PERKIN and HUMMEL), T., 1567; P., 1896, 185.
- Chelerythrine and its salts (ORLOFF), A., i, 396.
- Chelidonium magus*, alkaloids of (ORLOFF), A., i, 396.
- Chelilysine and its salts (ORLOFF), A., i, 396.
- Chemical constitution, relation of, to physiological action (BLUMENTHAL), A., ii, 377.
- Chinine. See Quinine.
- Chinoline-blue. See Quinoline-blue.
- Chironol (BAUR), A., i, 57.
- acetyl and benzoyl derivatives of (BAUR), A., i, 57.
- Chironolic acid (BAUR), A., i, 57.
- Chloanthite from Sardinia (LOVISATO), A., ii, 183.
- Chloral, condensation of, with resorcinol (HEWITT and POPE), T., 1265; P., 1896, 150.
- Chloral hydrate, two crystalline forms of (POPE), P., 1896, 142.
- heat of solution in water, ethylic alcohol, chloroform, and toluene (SPEYERS), A., ii, 411.
- condensation of, with resorcinol (HEWITT and POPE), T., 1266; P., 1896, 150.
- Chloralglucosan (MEUNIER), A., i, 334.
- Chloralglucose (MEUNIER), A., i, 334.
- Chloralic acid (HANNIOT), A., i, 519.
- Chloralose (MEUNIER), A., i, 334.
- Chloranil (*tetrachloroquinone*), preparation of (HOFMANN LECTURE), T., 641, 699.
- action of sodium alkyl oxides on (JACKSON and GRINDLEY), A., i, 19.
- Chlorargyrite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- antimonial, from Broken Hill, N.S.W. (SMITH), A., ii, 30.

Chlorine, formation on heating manganese dioxide with potassium chlorate of (MCLEOD), T., 1015; P., 1896, 104.

retarding action of hydrochloric acid and metallic chlorides on the decomposition by light of aqueous solutions of (KLIMENKO), A., ii, 90.

conversion of, into hydrogen chloride (LORENZ), A., ii, 17.

Hydrochloric acid, electrolytic conductivity of ethereal solutions of (MALTBY), A., ii, 144.

electrolysis of (OETTEL), A., ii, 555.

apparatus for the electrolysis of (HIGLEY and HOWARD), A., ii, 557; (PICKEL), A., ii, 557.

freezing points of dilute solutions of (LOOMIS), A., ii, 352.

freezing points of concentrated aqueous solutions of (ROLOFF), A., ii, 291.

dry, action of, on alkaline earths (VELEY), A., ii, 360.

action of, on copper (ENGEL), A., ii, 171.

acceleration of the action of hydrogen peroxide on hydriodic acid by (HARCOURT and ESSON), A., ii, 238.

gaseous, action of, on salts of elements of the fifth group (SMITH and HIBBS), A., ii, 164.

absorption by silk of dilute (WALKER and APPLEBYARD), T., 1346; P., 1896, 147.

causes of secretion of, in the stomach (KOEPPÉ), A., ii, 376.

estimation of, in gastric juice (SJOQUIST), A., ii, 496; (MORACZEWSKI), A., ii, 671.

Chlorides, effect of, on algae (WYPLEL), A., ii, 266.

conversion of sulphates into (JANNASCH), A., ii, 574.

estimation of, volumetrically in presence of hypochlorites and chlorates (CARNOT), A., ii, 447.

estimation of, volumetrically in presence of chlorates and perchlorates (CARNOT), A., ii, 447.

estimation of, in wine, milk, blood, urine, beer, vinegar, &c. (DENIGÈS), A., ii, 386.

Chloric acid, electrolytic preparation of alkali salts of (OETTEL), A., ii, 517.

Chlorates, detection of, by resorcinol (DENIGÈS), A., ii, 332.

detection of, in presence of tartrates, nitrates, and nitrites (DENIGÈS), A., ii, 332.

Chlorine.

Chlorates, estimation of, volumetrically in presence of chlorides and hypochlorites (CARNOT), A., ii, 447.

estimation of, volumetrically in presence of chlorides and perchlorates (CARNOT), A., ii, 447.

separation of, from chromates and permanganates (DENIGÈS), A., ii, 332.

Hypochlorous acid, electrolytic preparation of alkali salts of (OETTEL), A., ii, 517.

Hypochlorites, estimation of, volumetrically in presence of chlorides and chlorates (CARNOT), A., ii, 447.

Perchlorates, estimation of (KREIDER), A., ii, 123.

estimation of, volumetrically in presence of chlorides and chlorates (CARNOT), A., ii, 447.

Chlorine peroxide, detonation of (DIXON and HARKER), T., 789; P., 1896, 57.

Chlorine, detection of, in organic compounds (RAIKOW), A., ii, 70.

separation of, quantitatively from bromine (BUGARSZKY), A., ii, 216.

Chloritoid from Michigan (HOBBS), A., ii, 33.

Chloro-derivatives. See:—

Acenaphthenone.

Acetamide.

Acetic acid.

Acetoacetic acid.

Acetochloropyridinecarboxylic acid.

Acetone.

α -Acetophenylsemicarbazide.

Acetopicolinic acids.

Acetopiperidide.

Acetoxime.

Acetylmalic acid.

Anisoil.

Anthracene.

Anthracenedisulphonic acid.

Anthracenesulphonic acid.

Benzaldehyde.

Benzantialdoxime.

Benzsynaldoxime.

Benzamidobenzene.

Benzanilide.

Benzene.

Benzeneazosalicylic acids.

Benzenediazonium salts.

Benzenesulphonamide.

Benzenyloxime.

Benzobutylamide.

Benzoformanilide.

Benzoic acid.

Benzoylcarbazole.

Chloro-derivatives. See:—

Butylamines.
iso-Butylphthalazine.
m-iso-Butyltoluene.
 Caffeine.
 Camphene.
 Camphenephosphonic acid.
 Camphenesulphonic acids.
 Camphopyric anhydride.
 Camphor.
 Camphoric acids.
 Camphoric anhydride.
 Camphydrene.
 Carbazole.
 Carbonic acid.
 Crotonamide and *iso*-Crotonamide.
 β -Crotonanilide and *iso*-Crotonanilide.
 Crotonic acid and *iso*-Crotonic acid.
iso-Crotonic chloride.
 Crotonic- α -naphthylamide.
iso-Crotonic- α -naphthylamide.
 Cymene.
 Cymenesulphonic acids.
 Diamyloxyquinol.
 Diamyloxyquinone.
 Diamyloxyquinonediamylhemiacetal.
 Diazoaminobenzene.
 Diazobenzene anhydride.
 Diazobenzenethiophenyl ethers.
 Dibenzylxyquinol.
 Dibenzylxyquinone.
 Dibutylamine.
 3 : 3-Diethoxybenzophenones.
 Diethoxyquinol.
 Diethoxyquinone.
 Diethoxyquinonediethylhemiacetal.
 3 : 3-Diethoxythiobenzophenones.
 Dihydrocymene.
 Dihydrometacymene (1-methyl-3-*iso*-propylcyclohexadiene).
 2 : 4-Dihydroxyacetophenone.
 3 : 4-Dihydroxyquinoline.
 $\alpha\gamma$ -Diketopyrhydrindene.
 Dimethoxyquinol.
 Dimethoxyquinonediethylhemiacetal.
 Dimethoxyquinonedimethylhemiacetal.
 Dimethoxyquinone.
 3 : 3-Dimethoxybenzophenone.
 3 : 3-Dimethoxythiobenzophenone.
 Dimethylbarbituric acid.
 Dimethylmalonimide.
 Dioxymethylpurin.
 Diphenoxyquinone.
 Diphenyl.
 Diphenylamine.
 Diphenylformamidine.
 Diphenylmethane, *o*-cyano-.
 Diphenylsulphoxide.
 Dipropylpropional.
 Dithienyl.
 Ethylic ether.

Chloro-derivatives. See:—

Ethylideneanthranilic acid.
p-Ethyltoluene.
p-Ethyltoluenesulphonic acid.
p-Ethyltoluenesulphonic chloride.
 Fluoflavine.
 Fluorenone.
 Formamidobenzene.
 Formanilide.
 Formic acid.
 Formo-*p*-toluidide.
 Fumaric acid.
 Gallic acid.
 Glyoxylic acid.
 Guaiacol.
 Hexahydrocymene.
m-Hexyltoluene.
 Hydrolapachol.
 Hydroxybenzylphenazone.
 Hydroxyethylphenazone.
 Hydroxymethylphenazone.
 α -Hydroxypropionic acid.
 α -Hydroxypyrindone.
 1-Hydroxyquinolinephenazine.
 Hydroxyquinolinequinones.
 Hydroxyquinolines.
 Indophenazine.
 Isatin.
 Isatinsemicarbazone.
 Ketopentene.
 $\alpha\gamma$ -Ketopyrhydrindenecarboxylic acid.
 Ketostearic acid.
 Lactic acid.
 Maleic acid.
 Maleinuric acid.
 Malonic acid.
 Methane.
 Methanesulphonepropionic acid.
 Methenyl-*o*-aminothiophenol.
 3-Methoxyquinoline.
 1-Methyl-3-*isobutyl*cyclohexadiene.
 α -Methylbutyric acid.
 α -Methylbutyric chloride.
iso-Cyanuric acid, methylic salt.
 1-Methyl-3-hexylcyclohexadiene.
 Methylindazole.
 1-Methyl-3-*isopropyl*cyclohexadiene.
 Methylpurin.
 Methyltaurocarbamic acid.
 Methyltriethylphosphonium chloride.
 Naphthalenesulphonic acids.
 Naphthol.
 α -Naphthylic carbonate.
 Oxymethylpurin.
 Oxyvinylpicolinic acid.
cyclo-Pentene.
 Phenol.
 Phenyl tolyl ketone.
 Phenylaminobenzylhydrazine.
 Phenyldibenzyl-*m*-diazine.
 Phenyldihydro- β -phenotriazine.
 Phenylic sulphide.

Chloro-derivatives. See :—

2'-Phenylindazole.
 Phenylketotetrahydroquinazoline.
 Phenylnitrobenzyl nitrosamine.
 β -Phenylpropionic acid.
 Phenylisopropylacetic acids.
 2-Phenylpyridine.
 4'-Phenylquinazoline.
 Phenylthiotetrahydroquinazoline.
iso-Phthalic acid.
 Propaldehyde.
 Propane.
 Propylene.
 Propyl ether.
 1'-Propylphthalazine.
 1-Propylpiperidine.
 1' : 3'-Propyl*iso*quinoline.
 Pulegone.
 Pyrhydrindone.
 Pyrindone.
 Pyrogallol.
 Quinazoline.
 Quinoline.
 Quinolinephenazine.
 3 : 4-Quinolinequinone.
 Quinonedimalonic acid.
 Quinoxaline.
 Resoreinol.
 Ricinin.
 Succinic acid.
 Sulphochlorobenzoic chloride,
 Terephthalic acid.
 Tetrahydrocymene.
 5 : 5 : 5 : 5-Tetramethoxytetraphenyl-
 ethylene.
 5 : 5 : 5 : 5-Tetraethoxytetraphenyl-
 ethylene.
 Theophylline.
 Thienyltriphenylmethane.
 Toluene.
 Toluenesulphonamide.
m- and *p*-Toluic acids.
 Toluquinone.
 1 : 3 : 4-Triketohydroquinoline.
 Veratrole.
 Vinylpyridinecarboxylic acid.
 Xylenes.
 Xylenesulphonic acid.
 Xylidine.
 Xyloquinone.
 Chloroform, manufacture of, from car-
 bon tetrachloride (ANONYMOUS),
 A., i, 633.
 heat of evaporation of (BECKMANN,
 FUCHS, and GERNHARDT), A., ii,
 237.
 sulphur as a preservative of (ALLAIN),
 A., i, 3.
 action of, on nerve (WALLER), A., ii,
 52.
 Chloromelanite (DAMOURE), A., ii, 115.
 Chloropal (KATZER), A., ii, 189.

Chlorophyll (SCHUNCK and MARCH-
 LEWSKI), A., i, 181 ; (TSCHIRCH),
 A., i, 624.
 chemistry of (SCHUNCK and MARCH-
 LEWSKI), A., i, 496, 574.
 oxidation of (SCHRÖTTER-KRISTELLI),
 A., ii, 208.
 Alkylchlorophyll, effect of heating,
 with alkali (SCHUNCK and MARCH-
 LEWSKI), A., i, 574.
d-Cholic acid, specific rotation of (VAH-
 LEN), A., i, 454.
 Cholesterol, compounds of fatty acids
 with (HÜRTLE), A., ii, 485.
 reduction of (SCHRÖTTER-KRISTELLI),
 A., ii, 208.
 ketone obtained by the oxidation of
 (MAUTHNER and SUIDA), A., i,
 426.
 from human faeces (BONDZYŃSKI),
 A., ii, 319.
iso-Cholesterol in *vernix caseosa* (RUP-
 PEL), A., ii, 199.
 Cholesterols of cryptogams (GÉRARD),
 A., i, 21.
 α -Cholesterone (MAUTHNER and SUIDA),
 A., i, 425.
 β -Cholesterone (MAUTHNER and SUIDA),
 A., i, 425.
 α -Cholesterylene (MAUTHNER and
 SUIDA), A., i, 425.
 β -Cholesterylene (MAUTHNER and
 SUIDA), A., i, 425.
 Cholesterylic chloride (MAUTHNER and
 SUIDA), A., i, 426.
 substance derived from, by the
 action of silver nitrate (MAUTHNER
 and SUIDA), A., i, 426.
 nitro- (MAUTHNER and SUIDA), A.,
 i, 426.
 ether (MAUTHNER and SUIDA), A., i,
 425.
 tetrabromide (MAUTHNER and
 SUIDA), A., i, 426.
 Cholic acid, constitution of (SEŃKOW-
 SKI), A., i, 453.
 preparation, properties, and rotatory
 power of (VAHLEN), A., i, 453.
 ethylic salt of (LASSAR-CORN), A., i,
 582.
 Choline, occurrence of, in *Vicia sativa*
 (SCHULZE), A., ii, 208.
 Chondrodite from Nordmark, Sweden
 (SJÖGREN), A., ii, 114.
 Chromatin, function of, in animal and
 vegetable cells (MACALLUM), A., ii,
 317.
 Chrome-steel, analysis of (RIDEAL and
 ROSENBLUM), A., ii, 276.
 Chromite (*chrome iron ore*), analysis of
 (RIDEAL and ROSENBLUM), A., ii,
 276.

- chromium, properties of, when obtained from its amalgam (FÉRÉE), A., ii, 304.
- chromium-alloys with aluminium (COMBES), A., ii, 604.
- with copper (MOISSAN), A., ii, 602.
- with iron (BENNEVILLE), A., ii, 174.
- chromium amalgams (FÉRÉE), A., ii, 303.
- chromates, detection of (ANTONY), A., ii, 390; (TARUGI), A., ii, 548.
- detection of, in presence of arsenites (TARUGI), A., ii, 340.
- dichromates, electrochemical preparation of (LORENZ), A., ii, 651.
- perchromic acid, solvents for (GROSVENOR), A., ii, 177.
- chromium iron carbides (BENNEVILLE), A., ii, 175.
- silicide (MOISSAN), A., ii, 174.
- thiophosphite (FERRAND), A., ii, 418.
- chromic salts, absorption spectra of (ETARD), A., ii, 133.
- caesium chlorides (WELLS and BOLTWOOD), A., ii, 107.
- chrome alum, effect of heat on aqueous solutions of (DOUGAL), T., 1526; P., 1896, 183.
- hydroxide, action of oxalic acid on (ROSENHEIM), A., i, 279, 348.
- sulphate, constitution of solutions containing (WHITNEY), A., ii, 525.
- action of heat on solutions of (RECOURA), A., ii, 27.
- chromous ammonium carbonate (BAUGÉ), A., ii, 426.
- sulphide, crystallised (MOURLOT), A., ii, 304.
- thiopyrophosphate (FERRAND), A., ii, 473.
- chromosulphuric acid, colloidal (CALVERT and EWAN), P., 1896, 160.
- chromosulphuric acids (WHITNEY), A., ii, 525.
- sulphochromyl hydroxide (RECOURA), A., ii, 27.
- chromoxalic acid, colour of solutions of the potassium salt of (HAMBURGER), A., ii, 86.
- chromium, separation of, qualitatively from iron (GIACOMELLI), A., ii, 128; (HARE), A., ii, 127.
- separation of, qualitatively from iron, nickel, cobalt, manganese, aluminium, and zinc (HARE), A., ii, 127.
- estimation of (STEAD), A., ii, 221.
- separation of, from manganese, iron, and aluminium (JANNASCH and VON CLOEDT), A., ii, 222.
- chromium-tannage, analysis of used liquors from (HEAL and PROCTOR), A., ii, 393.
- chrysanine (*diaminophenylacridine*), discovery of (HOFMANN LECTURE), T., 610.
- chrysene, fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.
- chrysin, relation of, to luteolin (HERZIG), A., i, 494.
- non-formation of acid compounds of (PECKIN), T., 1443; P., 1896, 167.
- chrysocolla from Broken Hill, N.S.W. (LIVERSIDGE), A., ii, 657.
- from Hungary (PETHÖ), A., ii, 611.
- chrysosfluorene, constitution of (GRAEBE), A., i, 444.
- chrysoidine, composition of (HOFMANN LECTURE), T., 626.
- chrysoketone from α -naphthoylbenzamide, and its oxime (GRAEBE), A., i, 444.
- chrysophanohydroanthrone from rumicin (HESSE), A., i, 573.
- cinchenine (*cinchine*), hydrolytic decomposition of (KOENIGS), A., i, 63.
- cincholeuponic acid from meroquinene (KOENIGS), A., i, 63.
- constitution of (KOENIGS), A., i, 252.
- cinchomeramide (BLUMENFELD), A., i, 60.
- cinchomeronic acid (3:4-pyridinedicarboxylic acid), reduction of (KOENIGS and WOLFF), A., i, 698.
- diethylie salt of (BLUMENFELD), A., i, 60.
- ethylbetaine of (BLUMENFELD), A., i, 60.
- cinchona alkaloids, constitution of (KOENIGS), A., i, 328.
- crystalline form of (BEHRENS), A., i, 514.
- reduction products of (KONEK VON NORWALL), A., i, 395.
- detection of (JAWOROWSKI), A., ii, 629.
- cinchona extract, examination of (HULSEBOSCH), A., ii, 682.
- cinchonidine, formation of, from cinchonine (KOENIGS and HUSMANN), A., i, 707.
- actions of phosphorus pentachloride on (KOENIGS), A., i, 328.
- and its salts, microchemical reactions of (BEHRENS), A., i, 514.
- cinchonine, conversion of, into cinchonidine (KOENIGS and HUSMANN), A., i, 707.
- cinchotennine (KOENIGS), A., i, 64.
- cinnabar, artificial (IPPEN), A., ii, 108.
- estimation of mercury in, by electro-

- lysis (RISING and LENHER), A., ii, 338.
- Cinnamaldehyde, magnetic rotatory power, &c., of (PERKIN), T., 1126, 1145, 1149, 1227, 1247.
- action of, on hydrocotarnine (LIEBERMANN), A., i, 712.
- Cinnamene. See Styrene.
- iso*-Cinnamerylmandelic acid (JAPP and LANDER), P., 1896, 108.
- Cinnamic acid (*β -phenylacrylic acid*), physiological action of (HOFMANN LECTURE), T., 698.
- ethylic salt, magnetic rotatory power, &c., of the (PERKIN), T., 1145, 1149, 1228, 1247.
- guaiaecol salt, detection of (DRAGENDORFF), A., ii, 278.
- Cinnamic acid, bromo-derivatives of (MICHAEL), A., i, 682.
- α - and β -bromo-, isomerism of (ERLENMEYER), A., i, 46.
- Cinnamic acids, isomeric (ERLENMEYER), A., i, 46.
- Cinnamic alcohol, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1126, 1149, 1228, 1247.
- Cinnamoylphenylsemicarbazide (WIDMAN), A., i, 630.
- Cinnamoylseopoleine (MERCK), A., i, 65.
- di*-Cinnamylidenediaminopentamethylenetetramine (DUDEN and SCHARFF), A., i, 123.
- Cinnamylideneimide, hydrochloride of (BUSCH), A., i, 706.
- Circulation, time of, in different animals (STEWART), A., ii, 48.
- Citraconic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- behaviour of, on heating under slight pressure (KRAFFT and DYES), A., ii, 89.
- amylie salt, rotatory power of (WALDEN), A., ii, 633.
- ethylic salt, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
- action of alcoholic ammonia on (KÖRNER and MENOZZI), A., i, 205.
- action of ethylic iodide and zinc on (MICHAEL), A., i, 597.
- Citraconic acid, bromo-, silver salt of (MICHAEL), A., i, 132.
- Citraconic anhydride, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
- Citradibromopyrotartaric acid (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Citradibromopyrotartaric anhydride (MICHAEL), A., i, 131.
- action of aniline on (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- p*-tolilic acid of (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Citrazinic acid (2 : 6-*dihydroxypyridine-3-carboxylic acid*), discovery of (HOFMANN LECTURE), T., 724.
- action of chloroform and sodium hydroxide on (SELL), T., 1448; P., 1896, 168.
- monaldehyde acid of. See Aldehydo-citrazinic acid.
- Citric acid, formation of, by oxidation of cane-sugar (HICKS), A., i, 136; (PHIPSON), A., i, 137; (SEARLE and TANKARD), A., i, 137.
- absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
- ethylic salt, action of chloral on (EDELEANU and ZAHARIA), A., i, 348.
- methylic salt, action of chloral on (EDELEANU and ZAHARIA), A., i, 348.
- Citric-di- β -naphthalide anhydride, and β -naphthylamine salt (GASSMANN), A., i, 487.
- Citronella oil. See *Andropogon nardus*.
- Citronellaldehyde (TIEMANN and SCHMIDT), A., i, 382.
- constitution of (BARBIER and BOUVEAULT), A., i, 492.
- oxidation of (TIEMANN and SCHMIDT), A., i, 383.
- Citronellaldehydesemicarbazone (BARBIER and BOUVEAULT), A., i, 492.
- Citronellie acid, oxidation of (TIEMANN and SCHMIDT), A., i, 383.
- p*-toluidide of (BARBIER and BOUVEAULT), A., i, 492.
- Citronellol, oxidation of (TIEMANN and SCHMIDT), A., i, 383.
- acetate and formate (TIEMANN and SCHMIDT), A., i, 383.
- Citrus limetta* *risso*, constituents of (GILDEMEISTER), A., i, 54.
- vulgaris*, basic constituents of (JAHN), A., i, 712.
- Cladonia*, absence of atranoric acid in some species of (ZOPF), A., i, 103.
- Clay, formation of (HOLLAND and DICKSON), A., ii, 261.
- Clay. See also Fuller's earth.
- Cleveite, spectrum of the gas obtained from (RUNGE and PASCHEN), A., ii, 1.
- absorption of helium by (TILDEN), A., ii, 655.

- Clinocllore from Canada (HOFFMANN), A., ii, 257.
 Clinohumite from Nordmark, Sweden (SJÖGREN), A., ii, 114.
 Clover. See Agricultural chemistry.
 Coagulability of blood, effect of peptone injections on (STARLING), A., ii, 197.
 Coagulation of blood, influence of certain salts on the (HORNE), A., ii, 437.
 antagonistic action on, between different salts (RINGER), A., ii, 49.
 in albino animals (PICKERING), A., ii, 664.
 Coal from Japan (BROWNE), A., ii, 656.
 argon in (SCHLÆSING), A., ii, 655.
 arsenic in (DOHERTY), A., ii, 566.
 vanadiferous, from Peru (TORRICO Y MECA), A., ii, 252.
 estimation of sulphur in (MABERY), A., ii, 387.
 Coal-gas. See Gas.
 Coals, Austrian (JOHN and EICHLEITER), A., ii, 252.
 Servian (STANOJEVIĆ), A., ii, 255.
 Cobalt in the sands near Brussels (CROCQ), A., ii, 434.
 atomic weight of (HEMPEL and THIELE), A., ii, 302.
 action of hydrogen peroxide on solutions containing (DURRANT), P., 1896, 96.
 Cobalt-bases, ammoniumdinitrodiamine cobalt oxalate (JÖRGENSEN), A., ii, 426.
 oxalopurpureocobalt salts (JÖRGENSEN), A., ii, 424.
 pentamineoxalopurpureocobalt salts (JÖRGENSEN), A., ii, 424.
 tetramineoxalopurpureocobalt salts (JÖRGENSEN), A., ii, 425.
 Cobalt salts, absorption spectra of (ÉTARD), A., ii, 133.
 apparatus for showing the conversion of cobaltous into cobaltic (ELBS), A., ii, 519.
 action of magnesium on solutions of (VITALI), A., ii, 420.
 injurious action of, on plants (HASELHOFF), A., ii, 267.
 boride (MOISSAN), A., ii, 424.
 chloride, electrolytic dissociation of, at different temperatures (SALVADORI), A., ii, 512.
 niobate (LARSSON), A., ii, 564.
 hydrated oxide of. See Schulzenite.
 sesquioxide, precipitation of, by hypochlorous acid (E. KLIMENKO and B. KLIMENKO), A., ii, 303.
 dioxide, compound of, with magnesia (DUPAU), A., ii, 647.
 Cobalt silicide (VIGOUROUX), A., ii, 176.
 phosphide (GRANGER), A., ii, 651.
 sesquiphosphide (GRANGER), A., ii, 602.
 caesium sulphate, density and optical behaviour of (TUTTON), T., 428.
 potassium sulphate, density and optical behaviour of (TUTTON), T., 419.
 rubidium sulphate, density and optical behaviour of (TUTTON), T., 424.
 sulphide, compound of, with carbon bisulphide and ammonia (WIEDE and HOFMANN), A., ii, 363.
 Cobalt, detection of, microchemically (SCHRÖDER VAN DER KOLK), A., ii, 578.
 detection of, by nitroso- β -naphthol (VON ILINSKI) A., ii, 451.
 detection of, in presence of nickel (DURRANT), P., 1896, 96.
 separation of, qualitatively, from iron, nickel, chromium, manganese, aluminium, and zinc (HARE), A., ii, 127.
 separation of arsenic from (JANNASCH and LEHNERT), A., ii, 547.
 separation of manganese from (JANNASCH and LEHNERT), A., ii, 547.
 separation of, electrolytically, from gold and silver (SMITH and WALLACE), A., ii, 220.
 Cobaltocobalticyanic acid (JACKSON and COMEY), A., i, 402.
 α -Cocæthyline and its salts (WILLSTÄTTER), A., i, 709.
 Cocaine, formation of isomerides of, from tropinone cyanhydrin (WILLSTÄTTER), A., i, 708.
 effect of, on the germination of seeds (Mosso), A., ii, 326.
 α -Cocaine and its salts and methiodide (WILLSTÄTTER), A., i, 708.
 Cocoa-nut shells (DE HAAS and TOLLENS), A., ii, 64.
 Coffee, amount of fat, sugar, and tannin in (HERZFELDT and STUTZER), A., ii, 63.
Coleus verschaffelti, dyes of (WEIGERT), A., i, 388.
 Collidine, bromo- (2-methyl-5 α -bromoethylpyridine), condensation of, with piperidine and with coniine (KNUDSEN and WOLFFENSTEIN), A., i, 60.
 Collidineconiine and its platinochloride (KNUDSEN and WOLFFENSTEIN), A., i, 60.
 Collidinepiperidine and its hydrochloride (KNUDSEN and WOLFFENSTEIN), A., i, 60.
 Colloidal animal tissues, reversal by

agents of the double refraction of (VON EBNER), A., ii, 457.
 Colloidal solutions, theory of (KRAFFT), A., ii, 468.
 derivatives of the higher paraffins (KRAFFT and STRUTZ), A., ii, 467.
 Colloids, a filter for separation of, from crystalloids (MARTIN), A., ii, 665.
Colocasia antiquorum, polyanhydride of diglucose in (YOSHIMURA), A., ii, 60.
 Colophony. See Rosin.
 Colour. See Light.
 Colouring Matters. See:—
Afzelia guanzensis, dyes from.
 Alizarin.
 Alizarin-yellow.
 Alkachlorophyll.
 Amantin.
 Amaranth, red dye of.
 Aniline-black.
 Aniline-blue.
 Aniline-purple.
 Anilinoaposafranine.
 Anilinomauveine.
 Anilinophenylaposafranine.
 Anilinosafraanol.
 Anilinosafrazone.
 Anthracene dyes.
 Anthrachryson.
 Anthraflavic acid, and *iso*-Anthraflavic acid.
 Anthrapurpurin.
 Anthraquinone group of yellow dyes.
 Aposafranine.
 Aurin.
 Autumnixanthin.
 Azo-dyes.
 Beans, blue.
 Benzylrosindone.
 Benzylrosinduline.
 Bilberries.
 Brazilin.
 Britannia-violet.
 Cabbage (potato), dye from.
 Chrysaniline.
 Chrysin.
 Chrysofluorene.
 Chlorophyll.
Coleus verschaaffelti, dyes of.
Cornus sanguinea, red dyes of.
 Cyanin.
 Dahlia.
 Dehydrothiotoluidine.
 Diethylaminonaphthophenoxazine.
 Diethylaminophenonaphthoxazine.
 Diethylsafraanine.
 Dihydroxyaposafranine.
 Dihydroxyflavone.
 Dimethylaminodiphenazone.
 Dimethylaminophenonaphthoxazine.
 Dimethylindirubin.
 Dimethylsafraanine.

Colouring Matters. See:—
 Diphenylamine dyes.
 Diphenylphenosfluorindine.
 Diphenylisotetrazolone.
 Dithiazolic derivatives.
 Dyes, natural yellow.
 Ethylmauveine.
 Ethylsafraanol.
 Eurhodines.
 Fluorindines.
 Hæmatoporphyrin.
 Hæmatoxylin.
 Hexamethyltriaminotriphenylmethane, dyes from.
 Hofmann-violet.
 Hydroxynaphthadiphenazone.
 Indigo.
 Indirubin.
 Indulines.
 Kermes berry.
 Luteolin.
 Mallow, dye from.
 Mauveine.
 Methoxyhexamethyltriaminotriphenylmethane.
 Methylphenosfluorindine.
 Myricetin.
 Pararosaniline.
 Pelagein.
 Peonol derivatives.
 Perkin's green.
 Phenazine dyes.
 Phenosafranine.
 Phenylene-red.
 Phenylene-red, methyl derivative of.
 Phenylfluorindine.
 Phenylindazoles.
 Phenylindulines.
 Phenylphenosfluorindine.
 Phenylrosaniline.
 Phosphine.
 Phyllocyanin.
 Phylloporphyrin.
 Phylloporpuric acid.
 Phyllotaonin.
 Phylloxanthin.
Phylolacca decandra, red dye of fruit of.
 Primuline base.
 Purpurin.
 Purpuroxanthin.
 Quinoline-blue.
 Rosaniline bases, coloured.
 Rosinduline, and *iso*-Rosinduline.
 Rosotoluidine.
 Safranines.
 Tetrethylaminodiphenoxazinium salts.
 Tetramethylaminodiphenoxazinium salts.
 Toluinotolylaposafranine.
 Triethylchrysaniline.

- Colouring Matters. See :—
 Triethylrosaniline.
 Trimethylchrysaniline.
 Trimethylrosaniline.
 Triphenylmethane dyes.
 Triphenylmethane series, sulphonated dyes from.
 Triphenylrosaniline.
 Triresoreinol.
 Turacin.
 Turaecoporphyrin.
 Wine-red.
- Columbic acid, preparation and properties of (HILGER), A., i, 624.
- Columbin, preparation and properties of (HILGER), A., i, 624.
- Columbite from New Hampshire (PENNINGTON), A., ii, 308.
 from N. Carolina (CHRUSTSCHOFF), A., ii, 567.
- Columbo roots, constituents of (HILGER), A., i, 623.
- Colza oil, oxidisability of (BISHOP), A., ii, 399.
 compound of, with sulphur (HENRIQUES), A., i, 204.
- Condenser, modified (VAN RIJN), A., ii, 91; (MICHAELIS), A., ii, 91.
 the so-called Liebig's (KAHLBAUM), A., ii, 244.
- γ -Coniceine (2-propyltetrahydropyridine), reduction of (WOLFFENSTEIN), A., i, 632.
- Coniceines, preparation of (HOFMANN LECTURE), T., 724.
- Coniine, constitution of (HOFMANN LECTURE), T., 723.
 condensation of, with bromocollidine (KNUDSEN and WOLFFENSTEIN), A., i, 60.
- l*- and *i*-Coniine, identity of a mixture of, with isoconiine (WOLFFENSTEIN), A., i, 632.
- iso*-Coniine, composition of (WOLFFENSTEIN), A., i, 632.
- Conhydrine, constitution of (HOFMANN LECTURE), T., 724.
- Conium maculatum*, alkaloids of (WOLFFENSTEIN), A., i, 632.
- Conophallus Konjak*, occurrence of two kinds of mannan in (KINOSHITA), A., ii, 60.
- Convicin, action of hydrochloric acid on (RITTHAUSEN), A., i, 416.
 formation of alloxantin from (RITTHAUSEN), A., i, 416, 668.
- Convolvulus arvensis*, evolution of oxygen by (PHIPSON), A., ii, 265.
 orizabeus (Pell), jalapin and a compound, $C_{13}H_{30}O$, from (KROMER), A., i, 385.
- Convolvulus scammonia* L., scammonin from (KROMER), A., i, 385.
- Conyrrine (2-propylpyridine), preparation of (HOFMANN LECTURE), T., 723.
- Cookeite from British Columbia (HOFFMANN), A., ii, 258.
 constitution of (CLARKE), A., ii, 37.
- Copaiba balsam, detection of fatty oils in (HIRSCHSOHN), A., ii, 508.
- Copellidine (2 : 5-methylethylpiperidine), separation of, from isocopellidine (LEVY and WOLFFENSTEIN), A., i, 624.
- Copellidines, stereoisomeric (LEVY and WOLFFENSTEIN), A., i, 624.
- Copper, specific heat of (BARTOLI and STRACCIATI), A., ii, 145.
 melting point of (HOLBORN and WIEN), A., ii, 87.
 solubility and rate of diffusion of, in mercury (HUMPHREYS), T., 247; P., 1896, 9; (ROBERTS-AUSTEN), P., 1896, 219.
 action of hydrochloric acid on (ENGEL), A., ii, 171.
 action of sulphuric acid on (BASKERVILLE), A., ii, 474.
 presence of, in food (LEHMANN), A., ii, 486.
- Copper-alloys with chromium (MOISSAN), A., ii, 602.
 with nickel, melting points of (GAUTIER), A., ii, 646.
 with tin (FOERSTER), A., ii, 177.
 solution and diffusion in (HUMPHREYS), T., 1682; P., 1896, 220.
 with vanadium (MOISSAN), A., ii, 609.
 with zinc, structure and constitution of (CHARPY), A., ii, 421.
 mechanical properties of (CHARPY), A., ii, 170.
 solution and diffusion in mercury of (HUMPHREYS), T., 1682; P., 1896, 220.
- Cupric salts, action of hydrogen sulphide on solutions of (BRÄTNER), A., ii, 648.
 influence of organic hydroxy-compounds on the precipitation of (KAHLENBERG), A., ii, 7.
 effect of, on the growth of the vine and on the soil (BERLESE and SOSTEGNI), A., ii, 267.
 non-toxic effect of, on plants (TSCHIRCH), A., ii, 329.
- chloride, fused, electrolysis of (LORENZ), A., ii, 23.
 electrolytic dissociation at different temperatures of (SALVADORI), A., ii, 512.

Copper.

- Cupric chromate and dichromate (SCHULZE), A., ii, 24.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- nitrate, energy and electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
- niobate (LARSSON), A., ii, 564.
- nitrosodisulphonate (SABATIER), A., ii, 642.
- sodium triphosphates (STANGE), A., ii, 643.
- thiophosphite (FERRAND), A., ii, 418.
- phosphide (GRANGER), A., ii, 603.
- silicide (CHALMOT), A., ii, 362; (VIGOUROUX), A., ii, 362.
- action of halogen acids on (COMBES), A., i, 417.
- sulphate, energy and electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
- dissociation pressure of hydrated (MÜLLER-ERZBACH), A., ii, 295.
- solubility of isomorphous mixtures of ferrous sulphate and (STORTENBEKER), A., ii, 14.
- action of magnesium on solutions of (VITALI), A., ii, 420.
- action of potassium ferrocyanide on (RAUTER), A., i, 3.
- cæsium sulphate, density and optical behaviour of (TUTTON), T., 441.
- potassium sulphate, density and optical behaviour of (TUTTON), T., 431.
- rubidium sulphate, density and optical behaviour of (TUTTON), T., 437.
- sulphide, preparation of normal (CORPOCK), A., ii, 562.
- physical change produced by gently heating (SPRING), A., ii, 290.
- electrochemical preparation of (LORENZ), A., ii, 648.
- reduction of, by the Bunsen flame (STICKNEY), A., ii, 523.
- ferrocyanide (RAUTER), A., i, 3.
- Cuprous ammonium bromide (WELLS and HURLBURT), A., ii, 107.
- chlorides (WELLS and HURLBURT), A., ii, 107.
- iodide (WELLS and HURLBURT), A., ii, 107.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 467.
- thiopyrophosphate (FERRAND), A., ii, 473.

Copper.

- Cuprous gold sulphide (MACLAURIN), T., 1275; P., 1896, 149.
- allylide (KEISER), A., i, 458.
- cyanide, thermochemical data of (VARET), A., ii, 149.
- Copper ores, estimation of sulphur in (KELLER and MAAS), A., ii, 498.
- pyrites after copper glance, from Russia (JEREMÉEFF), A., ii, 566.
- Copper, detection of, in waters (EGGLING), A., ii, 549.
- estimation of (MAWROW and MUTHMANN), A., ii, 338.
- estimation of, volumetrically (SPICA), A., ii, 127.
- estimation of, volumetrically, by alkalis (RUOSS), A., ii, 500.
- estimation of, by iodide assay (LOW), A., ii, 450.
- estimation of, by thiosulphate and heating to oxide (NISSENSON and NEUMANN), A., ii, 450.
- estimation of gold and silver in (SMITH), A., ii, 76.
- matte, estimation of gold and silver in (SMITH), A., ii, 76.
- estimation of, in presence of nickel (SPICA), A., ii, 127.
- commercial, estimation of oxygen in (BLOUNT), A., ii, 333.
- estimation of sulphur in (HEATH), A., ii, 497.
- separation of cadmium and zinc from (MAWROW and MUTHMANN), A., ii, 338.
- separation, electrolytically, from gold (SMITH and WALLACE), A., ii, 229.
- separation of manganese from (JANNASCH), A., ii, 546.
- separation of mercury from (JANNASCH), A., ii, 676.
- separation of nickel from (BREARLEY), A., ii, 676.
- separation of zinc and nickel from (JANNASCH), A., ii, 546.
- Cordierite from Bohemia (KATZER), A., ii, 188.
- Cornus sanguinea*, red dye of (WEIGERT), A., i, 388.
- Corundum (ruby) from Burma (BROWN and JUDD), A., ii, 32.
- genesis and alteration of (BROWN and JUDD), A., ii, 33.
- See also Emery.
- Corylin, the proteid of the walnut, properties of (OSBORNE and CAMPBELL), A., i, 716.
- Cotoin, non-occurrence of, in *Drimys granatensis* (HESSE), A., ii, 62.
- detection of (FORMÁNEK), A., ii, 401.

- Cotton-seed oil, detection of, in lard (DUPONT), A., ii, 485.
 estimation of the acetyl numbers of (SPAETH), A., ii, 454.
 oxidisability of (BISHOP), A., ii, 399.
- Cotton seeds, proteids of (OSBORNE and VORHEES), A., ii, 210.
- Coumarin, refraction equivalent of (ANDERLINI), A., ii, 229.
- iso*-Coumarincarboxylic acid, reduction of, and action of aqueous soda on (BAMBERGER), A., i, 95.
- Coumarone, magnetic rotatory power, &c., of (PERKIN), T., 1201, 1240.
- Cratægus Oxyacantha*, colouring matter in (PERKIN and HUMMEL), T., 1570; P., 1896, 186.
- Creamometers, untrustworthiness of, for estimation of fat in pasteurised milk (CAZENEUVE and HADDON), A., ii, 130.
- Creatinine, percentage of, in blood (COLLS), A., ii, 666.
 excretion of, during work and rest (ACKERMANN), A., ii, 121.
 detection of, in urine (DE CONINCK), A., ii, 132.
 estimation of, in urine (KOLISCH), A., ii, 283.
- Cresol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1135, 1185, 1240.
- iso*-Cresol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1185, 1240.
- o*-Cresol, magnetic rotatory power, &c., of (PERKIN), T., 1126, 1129, 1183, 1239.
 phenylic substance derived from (JEITELES), A., i, 420.
 substance obtained by distillation of, with lead oxide and a product of its reduction (JEITELES), A., i, 420.
 nitrogenous compound obtained by the action of phenylhydrazine on a derivative of (JEITELES), A., i, 420.
- o*-Cresol, *dinitro*-, action of nitric acid on the mono- and di-methylamine derivatives of (FRANCHIMONT), A., i, 602.
- m*-Cresol, magnetic rotatory power, &c., of (PERKIN), T., 1126, 1129, 1183, 1239.
 effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 474.
trinitro-, action of nitric acid on the mono- and di-methylamine derivatives of (FRANCHIMONT), A., i, 602.
- p*-Cresol, magnetic rotatory powers, &c., of (PERKIN), T., 1126, 1129, 1183, 1239.
dinitro-, action of nitric acid on the mono- and di-methylamine derivatives of (FRANCHIMONT), A., i, 602.
- m*-Cresolbisazo-*o*-toluene (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Cresolbisazo-*m*-toluene (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 27.
- m*-Cresolbisazo-*p*-toluene (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 27.
- Critical phenomena of mixtures of ethane and nitrous oxide (KUENEN), A., ii, 10.
- Critical pressure of ethylic alcohol (BATELLI), A., ii, 150.
- Critical temperature. See Heat.
- Critical volume, a method of measuring the (ZAMBIASI), A., ii, 234.
 of ethylic alcohol (BATELLI), A., ii, 150.
- Crocoite from Tasmania (LIVERSIDGE), A., ii, 657.
- Crotonaldehyde, oxidation of (CHARON), A., i, 407, 408.
 reduction products of (CHARON), A., i, 637, 661.
 pinacone of (CHARON), A., i, 637.
- Crotonamide, β -chloro- (AUTENRIETH), A., i, 592.
- iso*-Crotonamide, β -chloro- (AUTENRIETH), A., i, 592.
- Crotonanilide, β -chloro- (AUTENRIETH), A., i, 592.
- iso*-Crotonanilide, β -chloro- (AUTENRIETH), A., i, 592.
- Crotonic acid, α -chloro-, action of chlorine on (VALENTIN), A., i, 79.
 ethylic salt, condensation of, with acetoacetic acid (RUHEMANN and WOLFF), T., 1391; P., 1896, 166.
- β -chloro-, action of chlorine on (SZENIC and TAGGESELL), A., i, 81.
- elimination of carbonic anhydride from (MICHAEL and CLARK), A., i, 132.
- ethylic salt (AUTENRIETH), A., i, 627.
- β -naphthyllic salt (AUTENRIETH), A., i, 592.
- $\alpha\beta$ -dichloro- (m. p. 75.5°), centric symmetrical (SZENIC and TAGGESELL), A., i, 81.
 (m. p. 92°), symmetrical (SZENIC and TAGGESELL), A., i, 81.

Crotonic chloride, β -chloro-, distillation of (AUTENRIETH), A., i, 592.
iso-Crotonic acid, β -chloro- (SZENIC and TAGGESELL), A., i, 81.
 ethylic salt of (AUTENRIETH), A., i, 627.
 β -naphthyllic salt (AUTENRIETH), A., i, 592.
iso-Crotonic chloride, β -chloro-, distillation of (AUTENRIETH), A., i, 591, 592.
allo-Crotonic acid, β -chloro-, action of hydrochloric acid on (MICHAEL and CLARK), A., i, 132.
 Crotonic- α -naphthylamide, β -chloro- (AUTENRIETH), A., i, 592.
iso-Crotonic- α -naphthylamide, β -chloro- (AUTENRIETH), A., i, 592.
 Crotonyl alcohol. See Butenyl alcohol.
 α -Crotylamine (BOOKMAN), A., i, 200.
iso-Crotylamine and its salts (LUCHMANN), A., i, 546.
 Cryophyllite, constitution of (CLARKE), A., ii, 38.
 Cryptogams, constituents of the cell-membranes of (WINTERSTEIN), A., ii, 210.
Cryptomeria japonica, effect of lime and magnesia on the development of (LOEW and HONDA), A., ii, 446.
 Cryptoperthite from Greenland (USSING), A., ii, 372.
 "Crystalline." See Aniline.
 Crystallography:—
 Atomic weight, influence of, on the crystal characters of the sulphates containing potassium, rubidium, and caesium (TUTTON), T., 495; P., 1896, 71.
 Axes of the optical ellipsoid of the double sulphates of potassium, rubidium, and caesium, velocity of light along the (TUTTON), T., 466; P., 1896, 69.
 Axes of the optical ellipsoid, orientation of, for double sulphates of potassium, rubidium, and caesium (TUTTON), T., 460; P., 1896, 69.
 Cleavage of double sulphates of potassium, rubidium, and caesium (TUTTON), T., 455; P., 1896, 68.
 Dendrites, artificial (ARCTOWSKI), A., ii, 649.
 Distance ratios of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 458; P., 1896, 69.
 Crystalline form of chemically simple substances (RINNE), A., ii, 29.
 Morphology of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 486.

Crystallography:—

Morphology of optical isomerides (WALDEN), A., ii, 553.
 of chloral and bromal hydrates, thymol, and menthol (POPE), P., 1896, 142.
 of *cis*- π -camphanic acid (POPE), T., 973; P., 1896, 116.
 of *trans*-camphotricarboxylic acid (hydrates) (POPE), T., 978; P., 1896, 116.
 Optic axial angles of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 480; P., 1896, 70.
 Point systems corresponding to the sulphates containing potassium, rubidium, and caesium (TUTTON), T., 504.
 Polymorphism and molecular complexity (TUTTON), T., 509.
 Structural unit of the crystals of sulphates containing potassium, rubidium, and caesium (TUTTON), T., 507; P., 1896, 71.
 Crystalloids, a filter for separation of, from colloids (MARTIN), A., ii, 665.
 Crystals, running together and healing of (LEHMANN), A., ii, 160.
 Cubanite, composition of (SCHNEIDER), A., ii, 253.
 Cubebs, occurrence of cubebin in (PEINEMANN), A., i, 494.
 Cubebin, occurrence of, in piperaceous plants (PEINEMANN), A., i, 494.
 ψ -Cubebin in *Piper Lowong* (PEINEMANN), A., i, 495.
 dibromo- (PEINEMANN), A., i, 495.
 dinitro (PEINEMANN), A., i, 495.
Cucurbita maxima, edestin, a proteid in (OSBORNE and CAMPBELL), A., i, 716.
 Cumene (*isopropylbenzene*) from camphorone (KERP), A., i, 448.
 magnetic rotatory power, &c., of (PERKIN), T., 1082—1084, 1194, 1241.
 formation of, from cuminic acid (HOFMANN LECTURE), T., 611.
 sulphonation of (BAYRAC), A., i, 605.
n-Cumene (*propylbenzene*), magnetic rotatory power, &c., of (PERKIN), T., 1082, 1083, 1094, 1192, 1241.
 hydrogenation of (TCHITCHIBABIN), A., i, 351.
 pentabromo- (TCHITCHIBABIN), A., i, 351.
 ψ -Cumene (1 : 3 : 4-*trimethylbenzene*) from camphorone, isophorone, and acetophorone (KERP), A., i, 448.
 magnetic rotatory power, &c., of (PERKIN), T., 1064, 1130, 1193, 1241.

- ψ -Cumene, separation of, from coal-tar naphtha (HOFMANN LECTURE), T., 598.
- ψ -Cumenesulphoneglycocine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Cumenesulphonic acids, preparation of, (BAYRAC), A., i, 605.
- Cumengeite, artificial (FRIEDEL), A., ii, 32.
- o*-Cumenol (*o*-isopropylphenol) (BAYRAC), A., i, 606.
- m*-Cumenol (*m*-isopropylphenol) (BAYRAC), A., i, 606.
- preparation of (BAYRAC), A., i, 606.
- indophenol derivative of (BAYRAC), A., i, 606.
- ψ -Cumenol (6 : 1 : 3 : 4-hydroxytrimethylbenzene), substances $C_{10}H_{12}Cl_2O$, $C_{10}H_{10}Cl_2Br_2O$, and $C_{10}H_9Cl_2Br_3O$, derived from (AUWERS), A., i, 421.
- bromo-, aniline, phenylurethane, and piperidine derivatives of, and salts (AUWERS and MARWEDEL), A., i, 150.
- dibromo-, bromide (AUWERS), A., i, 149, 421 (AUWERS and MARWEDEL), A., i, 149.
- structure of (AUWERS), A., i, 421; (ZINCKE), A., i, 214.
- ammonia derivatives of (AUWERS), A., i, 420.
- aniline derivative of, and its hydriodide (AUWERS and SENTER), A., i, 424.
- compound $C_9H_{10}Br_2O_2$ obtained by action of moist silver oxide on (AUWERS and HOF), A., i, 422.
- compound $C_{18}H_{16}Br_4O_2$ obtained from (AUWERS and HOF), A., i, 422.
- compound $N(C_9H_9Br_2O)_3$ obtained from, by action of ammonia; its hydrobromide, and ethyl ether (AUWERS and HOF), A., i, 422.
- compounds $C_9H_9Br_3O$ and $C_{11}H_{13}Br_2O$ formed in the preparation of (AUWERS and HOF), A., i, 423.
- diethylamine derivative of, and its hydrobromide (AUWERS and HOF), A., i, 422.
- diethylaniline derivative of, and its methiodide (AUWERS and SENTER), A., i, 423, 424.
- dimethylaniline derivative of, and salts (AUWERS and AVERY), A., i, 150 (AUWERS and SENTER), A., i, 423.
- ethylamine derivative of, and its hydrobromide (AUWERS and HOF), A., i, 422.
- ψ -Cumenol, dibromo-, bromide, methylamine derivative of, and its hydrobromide (AUWERS and HOF), A., i, 422.
- methylaniline derivative of, and its salts (AUWERS and SENTER), A., i, 423.
- β -naphthylamine derivative of (AUWERS and SENTER), A., i, 423.
- phenylurethane derivative of (AUWERS and HOF), A., i, 422.
- piperidine derivative of, and its hydriodide (AUWERS and SENTER), A., i, 424.
- compound of, with quinoline (AUWERS and SENTER), A., i, 423.
- chloride (AUWERS and HOF), A., i, 423.
- iodide (AUWERS and HOF), A., i, 423.
- nitrite, constitution of (AUWERS), A., i, 421.
- pyridine derivative of, and its hydrobromide (AUWERS and AVERY), A., i, 151.
- dibromonitro- (AUWERS), A., i, 421.
- o*-nitro- (AUWERS), A., i, 421.
- dinitro-, isomeric forms of (AUWERS), A., i, 421.
- p*-Cumidine, preparation of (HOFMANN LECTURE), T., 625.
- action of cyanogen on (HOFMANN LECTURE), T., 590, 649.
- colouring matter obtained by oxidation of (HOFMANN LECTURE), T., 605.
- ψ -Cumidine, oxyphosphazo-compound of (MICHAELIS and SILBERSTEIN), A., i, 345.
- Cuminaldehyde (*p*-isopropylbenzaldehyde), magnetic rotatory power, &c., of (PERKIN), T., 1125, 1199, 1242.
- Cuminic acid (*o*-isopropylbenzoic acid), ethylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1125, 1176, 1238.
- β -iso-Cuminic acid (*mesitylenecarboxylic acid*) from dimesityldinitrosacyl (BAUM), A., i, 222.
- etherification of (MEYER), A., i, 433.
- Cuminy alcohol, magnetic rotatory power, &c., of (PERKIN), T., 1125, 1198, 1242.
- Cumylidene-*p*-aminothymol (PLANCHER), A., i, 358.
- Cupric. See under Copper.
- Cuprite after malachite from Russia (JEREMÉEFF), A., ii, 566.

- Cupropyrrite. See Cubanite.
- Cuscuretin (BARBEY), A., ii, 65.
- Cuscuta epithymum*, constituents of (BARBEY), A., ii, 65.
- Cuscutin, a glucoside from *Cuscuta epithymum* (BARBEY), A., ii, 65.
- Cuskhygrine, oxidation and constitution of (LIEBERMANN and CYBULSKI), A., i, 710.
- Cusparia trifoliata*, alkaloids of (BECKURTS), A., i, 66.
- Cusparine, purification and derivatives of (BECKURTS), A., i, 66.
- Cyanbenzyliline. See 5-Phenyl-2 : 6-dibenzyl-*m*-diazine, 4-amino-.
- Cyanethine acetic chloride (HERFELDT), A., i, 393.
- Cyanetholine. See Cyanic acid, ethylic salt of.
- Cyaniline, preparation of (HOFMANN LECTURE), T., 649.
- Cyanin. See Quinoline blue.
- Cyano-derivatives. See :—
- Acetamide.
 - Acetanilide.
 - Acetic acid.
 - β -Acetylpropionic acid.
 - Acetotetrahydro- β -naphthylamine.
 - Benzene.
 - Benzenesulphonamide.
 - Benzenesulphonanilide.
 - Benzenesulphonic acid.
 - Benzenesulphonic chloride.
 - Benzene *o*-sulphonic acid.
 - Benzenesulphotoluidides.
 - β -Benzoyl- α -benzylpropionic acid.
 - β -Benzoyl- α -methylpropionic acid.
 - Benzoylpropionic acid.
 - iso*-Butaldehyde.
 - Campholic acid.
 - Diazoaminobenzene.
 - Dihydrocampholytic acid.
 - 3 : 4-Dimethoxybenzoic acid.
 - Dimethylcarballylic acid.
 - Diphenylcarbamide.
 - Diphenylmethane.
 - s*-Diphenylthiocarbamide.
 - Ethenylamidoxime.
 - Hydroxydiphenylmethane.
 - Imidocarbonic acid.
 - Lauronic acid.
 - Mesitylene.
 - Naphthalene.
 - Phenylcarbamide.
 - Phenylhydrazine.
 - Phenylic chloride.
 - 3'-Propylisocarbostyryl.
 - Trimethylpimelic acid.
- Cyano. See also Nitriles.
- Cyanoform and its silver and sodium derivatives (SCHMIDTMANN), A., i, 458.
- Cyanoform, sodio- (SCHMIDTMANN), A., i, 458.
- Cyanogen, three possible forms of (NEF), A., i, 71.
- spectrum of the flame of (LEWES), T., 240; P., 1896, 2.
 - luminosity of the flame of (GROVES), P., 1896, 5; (LEWES), A., ii, 141.
 - behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.
 - combustion of (DIXON), T., 775; P., 1896, 55.
 - explosive combustion of (DIXON, STRANGE, and GRAHAM), T., 759; P., 1896, 53.
 - duration of the flame in the explosive combustion of (DIXON, STRANGE, and GRAHAM), T., 763; P., 1896, 54.
 - influence of, on the combination of carbonic oxide and oxygen (DIXON), T., 783; P., 1896, 56.
- Cyanogen compounds, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.
- bromide, improved method of preparation of (SCHOLL), A., i, 535.
 - preparation of (TCHERNIAC), A., i, 661.
- chloride, behaviour of, towards sodium alkylloxides (HANTZSCH and MAR), A., i, 33.
- Hydrocyanic acid, formation of, in *Pangium edule* (TREUB), A., ii, 327.
- preparation of pure (NEF), A., i, 75.
 - probably hydrogen isocyanide (NEF), A., i, 71.
 - action of acetic bromide on (NEF), A., i, 77.
 - action of hydrogen chloride on (NEF), A., i, 76.
- Cyanides, double, of silver and nickel with cyanides of the alkalis and alkaline earths (VARET), A., i, 633, 634.
- estimation of (DENIGÈS), A., ii, 385.
 - simple, estimation of, in presence of compound cyanides, &c. (CLENELL), A., ii, 223.
- Cyanide-working solutions, technical estimation of (BETTEL), A., ii, 224, 276.
- Ferrocyanides, new indicator for (STONE), A., ii, 126.
- estimation of, technically (BETTEL), A., ii, 276.
- Ferri-cyanides, estimation of, technically (BETTEL), A., ii, 277.

Cyanogen.

Cyanic acid, ethereal salts of, (HOFMANN LECTURE), T., 654.

ethylic salt of, preparation of (HOFMANN LECTURE), T., 716.

rate of change into the corresponding carbamides of the methyl-, dimethyl-, ethyl-, diethyl-, iso-amyl-, and tertiary amyl-ammonium salts of (WALKER and APPLEYARD), T., 193—202; P., 1896, 12.

action of heat on solutions of the tetramethyl- and triethyl-ammonium salts of (WALKER and APPLEYARD), T., 205; P., 1896, 12.

Thiocyanates, estimation of, technically (BETTEL), A., ii, 276.

Cyanuric acid, discovery and constitution of (HOFMANN LECTURE), T., 717.

from acetoxyoxamide and acetic anhydride (SCHIFF and MONSACCHI), A., i, 209.

thermochemical data of (LEMOULT), A., ii, 11.

solubility in water of (LEMOULT), A., ii, 11.

sodium and potassium salts, thermochemical data of the (LEMOULT), A., ii, 11.

sodium salts, action of carbonic anhydride on (LEMOULT), A., i, 70, 71.

triethylie salt, preparation of (HOFMANN LECTURE), T., 716.

Cyanuric acid, trithio-, trimethylie salt (HOFMANN LECTURE), T., 717.

iso-Cyanuric acid, trichlorotrimethylie salt of (HOFMANN LECTURE), T., 718.

triphenylie salt of (HOFMANN LECTURE), T., 715; (HANTZSCH and MAI), A., i, 34.

thio-, ethereal salts of, discovery of (HOFMANN LECTURE), T., 718.

vanomacelurin, non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.

vanopropine, acetic chloride (HERFELDT), A., i, 393.

cymene (*p-methylisopropylbenzene*), occurrence in oil of origanum (GILDEMEISTER), A., i, 54.

from trihydroxymenthane (GINZBERG), A., i, 447.

magnetic rotatory power, &c., of (PERKIN), T., 1125, 1194, 1242.

heat of evaporation of (BECKMANN,

FUCHS, and GERNHARDT), A., ii, 237.

Cymene. 2-chloro- (JÜNGER and KLAGES), A., i, 244.

3-chloro- (JÜNGER and KLAGES), A., i, 245.

5-chloro- (GUNDLICH and KNOEVENAGEL), A., i, 212.

m-Cymene (*m-methylpropylbenzene*), 5-chloro-2 : 4 : 6-trinitro- (GUNDLICH and KNOEVENAGEL), A., i, 213.

2 : 4 : 6-trinitro-5-anilido- (GUNDLICH and KNOEVENAGEL), A., i, 213.

p-Cymene, from lemon-grass oil (BARBIER and BOUVEAULT), A., 311.

Cymenecarboxylic acid (BOUVEAULT), A., i, 616.

Cymenesulphonic acid, from menthol (TOLLOCZKO), A., i, 381.

3-chloro-, barium salt and amide of (JÜNGER and KLAGES), A., i, 245.

5-Cymenesulphonic acid, 2-chloro-, barium salt, and chloride, amide, and anilide (JÜNGER and KLAGES), A., i, 245.

1 : 3 : 5-Cymidine, 2 : 4 : 6-trinitro- (GUNDLICH and KNOEVENAGEL), A., i, 213.

Cymophenone. See Phenyl cymyl ketone.

p-Cymoquinol (BAYRAC), A., i, 606.

p-Cymoquinone, preparation of (BAYRAC), A., i, 606.

Cymylglyoxylic acid; and its ethylic salt (BOUVEAULT), A., i, 616.

Cyst, ovarian, analysis of contents of (LIEBLEIN), A., ii, 263.

Cystine, in the liver of the dolphin (DRECHSEL), A., ii, 378.

Cytase, action of (GRÜSS), A., ii, 669.

Cytisine, occurrence of, in *Papilionaceæ* (PLUGGE), A., ii, 61.

amount contained in species of *Baptisia* (PLUGGE), A., i, 68.

identity of apopilocarpine with (DE MOER), A., i, 657.

identity of baptitoxine with (PLUGGE), A., i, 67.

detection of (GORTER), A., ii, 344.

Cytisus, occurrence of cytisine in various plants of order (PLUGGE), A., ii, 61.

D.

Dahlia. See Ethylmauveine.

Damourite from British Columbia (HOFFMANN), A., ii, 258.

Danaite from Ontario (HOFFMANN), A., ii, 191.

- Darapskite, artificial (SCHULTEN), A., ii, 610.
- Datisectin, non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.
- Datisca cannabina*, datiseetin, the colouring matter of (PERKIN), T., 1440; P., 1896, 167.
- Daucus carota*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Davyne, formula of (RAMMELSBERG), A., ii, 190.
- Deamidoalbumin, preparation and properties of (SCHIFF), A., i, 632.
- Deamidonitrosopeptone, solubility of (PAAL), A., i, 632.
- Deamidopeptone from deamidoalbumin (SCHIFF), A., i, 632.
- Deamidoglutin-peptone (PAAL), A., i, 456.
- Deamidonitrosoglutinpeptone (PAAL), A., i, 455.
- Deamidonitrosopropeptone (PAAL), A., i, 456.
- Decandicene, 1:3- (FOURNIER), A., i, 457.
- DECANES:—
- Decane, heat of evaporation of (LUGININ), A., ii, 146.
- Di-*iso*-amyl, nitro- (KONOWALOFF and NIKITIN), A., i, 673.
- labile form of (KNOWALOFF), A., i, 676.
- dinitro- (KONOWALOFF and NIKITIN), A., i, 674.
- DECENOIC ACID:— α -*iso*Propyl- β -*iso*-butylacrylic acid (KOHN), A., i, 462.
- DECENYLIC ALCOHOL:—Hexylallylearbinol, action of potassium hydrogen sulphate on (FOURNIER), A., i, 457.
- Decoic acid (*capric acid*) (BEHREND), A., i, 410.
- Decylamine, preparation of, and its salts (KONOWALOFF and NIKITIN), A., i, 673.
- Decylenediamine and its salts (KONOWALOFF and NIKITIN), A., i, 674.
- Dehydrocinchonine (KOENIGS), A., i, 64.
- Dehydrolapachone, constitution of (HOOKER), T., 1369.
- ψ -Dehydrolapachone (HOOKER), T., 1362, 1377.
- Dehydrothiitoluidine, action of bromine on (VAUBEL), A., i, 647.
- dibromo- (VAUBEL), A., i, 647.
- Dehydrosantonous acid, ethylic salt of, and its anhydride (RIZZO), A., i, 307.
- Dehydroundecylenic acid. See Hendecinoic acid: Dehydrohendecenoic acid.
- Density of gases, method of determining the (TOEPLER), A., ii, 235; (MOISSAN and GAUTIER), A., ii, 294.
- Density of the liquid and gaseous phases at the critical point (ZAMBIASI), A., ii, 234.
- of liquids, method of determining (PERKIN), T., 1043; P., 1896, 122.
- of very dilute solutions (KOHLE-RAUSCH), A., ii, 89.
- of optical isomerides (WALDEN), A., ii, 553.
- relative, of alloys of iron and antimony (LABORDE), A., ii, 652.
- Density of argon (RAYLEIGH), A., ii, 598.
- of hydrogen (THOMSEN), A., ii, 471; (MORLEY), A., ii, 595.
- of oxygen (THOMSEN), A., ii, 471; (MORLEY), A., ii, 518.
- of liquid oxygen and air (DEWAR), P., 1895, 226.
- of double sulphates of potassium, rubidium, and caesium (TUTTON), T., 456; P., 1896, 68.
- Density, vapour, Hofmann's method for the determination of (HOFMANN LECTURE), T., 724.
- of arsenic (BILZ), A., ii, 152.
- of arsenic trioxide (BILZ), A., ii, 152.
- of cadmium (BILZ), A., ii, 152.
- of metaphosphoric acid (TILDEN and BARNETT), T., 158; P., 1896, 30.
- of phosphoric anhydride (TILDEN and BARNETT), T., 154; P., 1896, 30.
- of thallium (BILZ), A., ii, 152.
- of zinc (BILZ), A., ii, 152.
- Denulein, estimation of, in beer wort (SCHJERNING), A., ii, 631.
- Deoxyamalic acid (FISCHER and ACH), A., i, 12.
- Deoxybenzoin. See Phenyl benzyl ketone.
- Deoxybenzofuroin (BADER), A., i, 417.
- Deoxycholic acid, physical constants of (VAHLEN), A., i, 454.
- Deoxycinchonidine and salts (KOENIGS), A., i, 328.
- Deoxycinchonine from cinchonine (KOENIGS), A., i, 264, 265.
- Deoxyconchinine from conchinine (KOENIGS), A., i, 265.
- Deoxyfuroin (BADER), A., i, 416.
- Deoxyquinine and salts (KOENIGS), A., i, 328.
- Desiccation, method of rapid, for serum (MARTIN), A., ii, 263.
- Desmotropodisantonous acid and its derivatives (ANDREOCCI), A., i, 185.
- Desmotroposantonous acid: its oxidation, and its sodium derivative, (ANDREOCCI), A., i, 185.

- Desmotroposantonous acid, methylic salt (ANDREOCCI), A., i, 185.
 bromo-, and its methylic salt (ANDREOCCI), A., i, 185.
 sodio-, and its ethylic salt (ANDREOCCI), A., i, 185.
- Desoxalic acid, ethylic salt of, preparation of (WISLICENUS), A., i, 672.
- Desylacetic acid (*β -benzoyl- β -phenylpropionic acid*), formation of, from desyleneacetic acid (JAPP and LANDER), P., 1896, 109.
 formation of, from diphenyldihydroxyglutonic acid (JAPP and LANDER), P., 1896, 108.
- Desylacetophenone monhydrazide (SMITH), A., i, 322.
- Desyleneacetic acid (*β -benzoylcinnamic acid*), formation of, from anhydrazetonebenzil (JAPP and LANDER), P., 1896, 107.
 reduction of (JAPP and LANDER), P., 1896, 109.
- Deuteroproteose. See Proteose.
- Dextrin, reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 151; P., 1896, 9.
- Achroodextrin (ZULKOWSKI and FRANZ), A., i, 120.
 preparation and purification of (BÜLOW), A., i, 274, 275.
 primary (MITTELMEIER), A., i, 336.
- Amylodextrin, from potato starch and caustic potash (BÜLOW), A., i, 273.
- Erythro-dextrin (ZULKOWSKI and FRANZ), A., i, 120; (BÜLOW), A., i, 274.
 primary, action of diastase on (MITTELMEIER), A., i, 336.
- Malto-dextrins, estimation of, in beer (MORRIS), A., ii, 395.
- Dextrins, separation of (BÜLOW), A., i, 274.
- Dextrose. See Glucose.
- Diabase, from Jersey, alteration of (HOLLAND and DICKSON), A., ii, 261.
- Diacenaphthylidenone, and its bromide (GRAEBE and JEQUIER), A., i, 444.
- Diacetamido-acetohydrazide (RADENHAUSEN), A., i, 138.
- Diacetamidoazobenzene (MELDOLA and ANDREWS), T., 11; P., 1895, 215.
- Diacetamidoazoxybenzene (MELDOLA and ANDREWS), T., 8; P., 1895, 215.
- : 4-Diacetamidodiphenylamine (NIETZKI and ALMENRÄDER), A., i, 164.
- : 4-Diacetamido-1-hydroxyquinoline (CLAUS and DEWITZ), A., i, 654.
- : 4 : 2-Diacetamidonaphthol (KEHRMANN and HERTZ), A., i, 566.
- 2 : 2'-Diacetamido-3 : 5 : 3' : 5'-tetramethyldiphenyl (KERSCHBAUM), A., i, 162.
- Diacetamidothymol (PLANCHER), A., i, 358.
- Diacetanilide (BLACHER), A., i, 33.
- Diacetoacetic acid, ethylic salt, thermochemical data of (GUINCHANT), A., ii, 12.
- Diacetobenzencsulphonamide (PILOTY), A., i, 556.
- Diacetodi-*p*-hydroxyphenylmalonamide (CASTELLANETA), A., i, 368.
- Diacetodi-*p*-hydroxyphenyloxamide (CASTELLANETA), A., i, 368.
- Diacetodimethylanilinediamide (SCHUSTER and PINNOW), A., i, 427.
- Diacetodiphenylethylenediamide (FEIST and ARNSTEIN), A., i, 259.
- m*-Diacetophenylenediamide (JACKSON and CALVERT), A., i, 538.
*di*bromo- (JACKSON and CALVERT), A., i, 538.
- Diacetophenylethylenediamine (FEIST and ARNSTEIN), A., i, 256.
- 1 : 3 : 1'-Diacetoxymethylanthracene (SCHUNCK and MARCHLEWSKI), T., 71; P., 1895, 202.
- 1 : 3-Diacetoxynaphthalene (FRIEDLÄNDER and RÜDT), A., i, 569.
- Diacetylacetone, condensation of (COLLIE and WILLSMORE), T., 295; P., 1896, 47.
- Diacetylbisphenylmethylpyrazolone (AUTENRIETH), A., i, 627.
- Diacetyldibromodinitrophenolphthalein (ERRERA and BERTÈ), A., i, 564.
- Diacetylcarbohydrazide (CURTIUS and HEIDENREICH), A., i, 143.
- Diacetyldianthranol (ORNDORFF and BLISS), A., i, 571.
- Diacetyldicyanide (NEF), A., i, 77.
- Diacetyl-*n*-dihydro- β -phenotriazine (PINNOW and SÄMANN), A., i, 366.
- Diacetyldihydroxymaleic anhydride. See Dihydroxymaleic anhydride, diacetyl derivative of.
- Diacetyldilactamide (COLSON), A., i, 284.
- 3 : 5-Diacetyl-2 : 4-dimethylpyrroline and its aurochloride (ZANETTI), A., i, 249.
- Diacetyldiphenyleneazone (TAÜBER), A., i, 686.
- Diacetyldurene (BAUM and MEYER), A., i, 228.
- 1 : 5-Diacetylisodurene (BAUM and MEYER), A., i, 228.
 constitution of (MEYER), A., i, 433.
 behaviour towards hydroxylamine (BAUM), A., i, 222.

- Diacetylgyceic acid, ethylic salt, rotatory power of solutions of, in benzene and acetic acid (FRANKLAND and PICKARD), T., 135, 136; P., 1896, 11.
freezing points of solutions of, in benzene and acetic acid (FRANKLAND and PICKARD), T., 134, 135; P., 1896, 11.
- Diacetylhydroxydiphenylethylamine (SÖDERBAUM), A., i, 484.
- Diacetylmalonenediamidoxime (SCHMIDTMANN), A., i, 458.
- Diacetylmesitylene, preparation of (MEYER), A., i, 547.
- Diacetylmethylpurpuroxanthin. See Diacetoxymethylanthracene.
- Diacetylmethylallyldithiourazole (FREUND and HEILBRUN), A., i, 415.
- Diacetylnepalin (HESSE), A., i, 573.
- Diacetylnepodin (HESSE), A., i, 574.
- Diacetylresacetophenone. See Acetic acid, resacetophenone salt of.
bromo-. See Acetic acid, resacetophenone salt of, bromo-.
- Diacetylsantonin acid (FRANCESCONI), A., i, 377.
- Diacetylsuccinyl- α -naphthalide (BOETTINGER), A., i, 443.
- Diacetyltartaric acid, dichloro-, rotatory power of the methylic, ethylic, propylic, and isobutylic salts of (FREUNDLER), A., ii, 554.
- Diacetyltartaric- β -naphthalide (GASSMANN), A., i, 487.
- Diacetyltrimethylhæmatoxylin (HERZIG), A., i, 379.
- Diacetyltrioreinol. See Trioreinol.
- Diacetylxylin, $C_5H_6Ac_2O_4$ (BADER), A., i, 335.
- Dialuric acid (*tartronylurea*), formation of, by hydrolysis of uric acid (GÉRARD), A., ii, 668.
- Dialkyldinitromethanes, reduction products of (BORN), A., i, 198.
- Diallage from Bavaria (SCHWAGER and GÜMBEL), A., ii, 432.
from Quebec (HOFFMANN), A., ii, 258.
- Diallylacetamide. See Octinoamide.
- Diallylacetic acid. See Octinoic acid.
- Diallylacetone, action of sodium on, in ethereal solution (OBERREIT), A., i, 666.
- Diallylacetonitrile. See Octinonitrile.
- Diallylethylamine. See Octinylamines.
- Diallylethylalcohol. See Octinylic alcohols.
- Diallylmalonic acid, ethylic salt, hydrolysis of (HJELT), A., i, 205.
- Diallylisopropylalcohol. See Enninylic alcohols.
- Diamond. See Carbon.
- Diamylamine, partial oxidation of (DE HAAS), A., i, 122.
- Diamylamineoxychlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diamylaminethiochlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisoamylaminoacetone (STOERMER and POGGE), A., i, 408.
hydrochloride and methiodide of (STOERMER and POGGE), A., i, 408.
oxime of (STOERMER and POGGE), A., i, 408.
semicarbazone of (STOERMER and POGGE), A., i, 408.
- Diamyloxyquinol, dichloro- (JACKSON and OENSLAGER), A., i, 293.
- Diamyloxyquinone, dichloro- (JACKSON and OENSLAGER), A., i, 293.
diamylhemiacetal, dichloro-, and its sodium salt (JACKSON and OENSLAGER), A., i, 293.
- Dianilinodibenzoyldihydroxy-*nn*-dihydropyrazine. See Dihydrohippurflavin, dianilide of.
- Dianilinotoluquinone (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- Dianisylidenecyclopentanone (*dianisylideneketopentamethylene*) (VORLÄNDER and HOBOM), A., i, 604.
- Dianthracene (*paranthracene*), crystalline form of, and its conversion into anthracene (ORNDORFF and CAMERON), A., i, 176.
- Dianthranol, diacetyl derivative (ORNDORFF and BLISS), A., i, 570.
- Diaphragm, semipermeable. See Membrane.
- Diastase, chemical nature and preparation of (OSBORNE), A., i, 399; (OSBORNE and CAMPBELL), A., i, 716.
effect of light on (GREEN), A., i, 110.
effect of salts on the amylolytic power of (GRÜSS), A., ii, 59.
proteids present in (OSBORNE), A., i, 398.
function of, in plants (GRÜSS), A., ii, 59.
detection of, in cells of plants (GRÜSS), A., ii, 59.
- Diastase, uropoietic in liver (RICHTER), A., ii, 119.
- Diazo-compounds, discovery of (HOFMANN LECTURE), T., 698.
classification of (HANTZSCH), A., i, 429.

- azo-compounds, constitution of (BLOMSTRAND), A., i, 361.
 aliphatic, general account of (CURTIUS), A., i, 337.
 preparation of (TRAUBE), A., i, 337.
 azo-group, migration of (SCHRAUBE and FRITSCH), A., i, 221.
 azoacetic acid, action of heat on (CURTIUS), A., i, 337.
 action of water and of alcohol on (CURTIUS), A., i, 338.
 sodium salt (TRAUBE), A., i, 337.
 ethylic salt (CURTIUS), A., i, 337.
 action of alkali on (CURTIUS), A., i, 338.
 azoacetophenone (ANGELI and RIMINI), A., i, 362.
 azo-acids, ethereal salts of, preparation of (CURTIUS), A., i, 337.
 azoamino-compounds, velocity of change into aminoazo-compounds (GOLDSCHMIDT and REINDERS), A., i, 556.
 azoaminobenzene, velocity of the change into aminoazobenzene (GOLDSCHMIDT and REINDERS), A., ii, 515.
 behaviour of, towards phenylhydrazine (WALTHER) A., i, 543.
 chloro- (BAMBERGER), A., i, 299.
 -dicyano- (PINNOW and SÄMANN), A., i, 367.
 -dinitro-, alkylation of (MELDOLA and STREATFEILD), P., 1896, 49.
 -dinitro-, alkylation of (MELDOLA and STREATFEILD), P., 1896, 51.
p-dinitro-, ethyl derivative (MELDOLA and STREATFEILD), P., 1896, 50.
 zoaminosulphanilic acid (SCHRAUBE and FRITSCH), A., i, 221.
 arium salt (SCHRAUBE and FRITSCH), A., i, 221.
 zoanthranilic acid. See Diazonium-anthranilic acid.
 zobenzene, action of benzhydrazide on (CURTIUS), A., i, 339.
 anhydride (BAMBERGER), A., i, 299.
 m-bromo- (BAMBERGER), A., i, 299.
 p-bromo- (BAMBERGER), A., i, 299.
 p-chloro- (BAMBERGER), A., i, 299.
 m-chloro- (BAMBERGER), A., i, 299.
 m-nitro- (BAMBERGER), A., i, 299.
 p-nitro- (BAMBERGER), A., i, 299.
 erbromide from *p*-chlorodiazobenzene anhydride (BAMBERGER), A., i, 299.
 chloride, reduction of (WALTER), A., i, 472.
 mercaptanhydrosulphide, *p*-nitro-, and its lead, silver, and mercuric derivatives (BAMBERGER and KRAUS), A., i, 219.
 Diazobenzene sulphide, di-*p*-nitro- (BAMBERGER and KRAUS), A., i, 218.
 conversion of, into the bisulphide (BAMBERGER and KRAUS), A., i, 220.
 bisulphide, di-*p*-nitro- (BAMBERGER and KRAUS), A., i, 220.
 Diazobenzene, *p*-chloro-, tribromide (HANTZSCH), A., i, 93.
 op-dichloro- (CHATTAWAY and EVANS), T., 850; P., 1896, 98.
 p-nitro-, methyl ether, conversion of, into *p*-nitrophenylhydrazinedisulphonic acid (BAMBERGER and KRAUS), A., i, 610.
iso-Diazobenzene hydroxide, *p*-nitro- (BAMBERGER), A., i, 299.
 sodium and silver derivatives (BAMBERGER), A., i, 539.
iso-Diazobenzene, *p*-nitro-, conversion of, into *p*-nitrophenylhydrazinedisulphonic acid (BAMBERGER and KRAUS), A., i, 610.
 Diazobenzenebenzoylhydrazine, *p*-nitro- (VON PECHMANN), A., i, 680.
 Diazobenzenehydroxyaminobenzyl (BAMBERGER), A., i, 222.
 Diazobenzenehydroxyaminomethane, *p*-nitro- (BAMBERGER), A., i, 222.
 Diazobenzeneimide, *p*-nitro- (VON PECHMANN), A., i, 680.
bis-Diazobenzenepentamethylenetetramine, di-*p*-nitro- and di-*m*-nitro- (DUDEN and SCHARFF), A., i, 123.
 Diazobenzenephenylhydrazonemethanedisulphonic acid, potassium salt (VON PECHMANN), A., i, 679.
 p-bromo-, potassium salt (VON PECHMANN), A., i, 679.
 Diazobenzenesulphonic acid, behaviour of metallic salts of (BAMBERGER), A., i, 362.
p-Diazobenzenesulphonic acid, oxidation of (ZINCKE), A., i, 169.
iso-Diazobenzenesulphonic acid, primary potassium salt, disilver salt (BAMBERGER), A., i, 539.
 Diazobenzenethiophenyl ether (HANTZSCH and FREESE), A., i, 217.
 p-bromo- (HANTZSCH and FREESE), A., i, 217.
 *di*bromo- (HANTZSCH and FREESE), A., i, 217.
 *tri*bromo- (HANTZSCH and FREESE), A., i, 217.
 o-chloro- (HANTZSCH and FREESE), A., i, 217.

- Diazobenzenethiophenyl ether, *anti-p*-chloro- (HANTZSCH and FREESE), A., i, 217.
*di*chloro- (HANTZSCH and FREESE), A., i, 217.
p-iodo- (HANTZSCH and FREESE), A., i, 217.
*di*iodo- (HANTZSCH and FREESE), A., i, 217.
anti-p-nitro- (HANTZSCH and FREESE), A., i, 218.
Diazo-ethers from *p*-chlorodiazobenzene anhydride (BAMBERGER), A., i, 299.
Diazohippuramide. See Hippurylazo-imide.
Diazohydroxyamidobenzene (BAMBERGER), A., i, 222.
Diazomethane (THIELE and MEYER), A., i, 407.
 reactions of (CURTIUS), A., i, 338.
Diazomethanedisulphonic acid, behaviour of additive sulphite compound of, towards diazobenzene acetate (VON PECHMANN), A., i, 679.
 dipotassium salt (VON PECHMANN and MANCK), A., i, 15.
 dehydration of (VON PECHMANN), A., i, 678.
Diazomesitylene iodide (HANTZSCH), A., i, 93.
Diazometallic derivatives (BAMBERGER), A., i, 540.
Diazonium group, the (HANTZSCH), A., i, 429.
Diazonium thiocyanates, intramolecular change in (HANTZSCH and HIRSCH), A., i, 428.
Diazoniumanthranilic acid (HANTZSCH and DAVIDSON), A., i, 541.
syn-Diazoniumbenzene-*o*-sulphonic acid, sodium and potassium salts (GERILOWSKI), A., i, 439.
anti-Diazoniumbenzene-*o*-sulphonic acid, sodium and potassium salts (GERILOWSKI), A., i, 439.
Diazoperhaloids (HANTZSCH), A., i, 92.
o-Diazophenol (HANTZSCH and DAVIDSON), A., i, 541.
 hydrosulphide, additive compound with hydrogen sulphide (HANTZSCH and FREESE), A., i, 218.
m-Diazophenol, mercuric chloride and mercuric iodide compounds (HANTZSCH and DAVIDSON), A., i, 541.
p-Diazophenol, cadmium iodide compound (HANTZSCH and DAVIDSON), A., i, 541.
 hydrosulphide, additive compound with hydrogen sulphide (HANTZSCH and FREESE), A., i, 218.
anti-p-Diazophenol cyanide (HANTZSCH and DAVIDSON), A., i, 541.
anti-Diazophenolcarboxylic acid, potassium salt (HANTZSCH and DAVIDSON), A., i, 541.
Diazophenols, characteristics and structure of (HANTZSCH and DAVIDSON), A., i, 540.
Diazophenolsulphonic acids, structure of (HANTZSCH and DAVIDSON), A., i, 541.
p-Diazo-*p*-phenoxybenzoic acid (HÄUSSERMANN and BAUER), A., i, 677.
Diazophenyl *p*-tolylketone (LIMPRICH and LENZ), A., i, 41.
Diazopiperonylacetone (ANGELI), A., i, 296.
iso-Diazo-salts, distinction from normal salts (BAMBERGER), A., i, 299.
Diazosuccinic acid, ethylic salt, action of heat on (CURTIUS), A., i, 338.
Diazosulphanilic acid and *p*-toluidine compounds from (SCHRAUBE and FRITSCH), A., i, 221.
 thiophenyl ether, and its *syn*-sodium and silver salts (HANTZSCH and FREESE), A., i, 218.
Diazosulphonates, dissociation of (BAMBERGER), A., i, 373, 439; (GERILOWSKI and HANTZSCH), A., i, 373, 428, 439.
Diazotetrazoleimide. See Tetrazylazide.
p-Diazotoluene, from diazosulphanilic acid and *p*-toluidine (SCHRAUBE and FRITSCH), A., i, 221.
p-Diazotoluene anhydride (BAMBERGER), A., i, 299.
iso-Diazo-*p*-toluene hydroxide, potassium derivative (BAMBERGER), A., i, 539.
6:1-Diazoxyanisole, 4-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 133; P., 1896, 164.
Diazoxybenzoic acid (DIEPOLDER), A., i, 615.
3:2-Diazoxyphenol, 5-nitro- (MELDOLA, WOOLCOTT, and WRAY), T., 133; P., 1896, 164.
Dibenzacetohydroxamic acid (NEF and JONES), A., i, 460.
Dibenzaconine and its salts (DUNSTON and CARR), P., 1895, 178.
Dibenzamide (BLACHER), A., i, 33.
Dibenzamidoazobenzene (MELDOLA and ANDREWS), T., 12; P., 1895, 215.
Dibenzamidodianilidosuccinic acid, amidanhydride of, and its calcium salt (RÜGHEIMER), A., i, 62.
2:4-Dibenzamido-1-hydroxyquinoline (CLAUS and DEWITZ), A., i, 654.

- exo*-Dibenzamido-*p*-xylene (LUSTIG), A., i, 164.
 nitro- (LUSTIG), A., i, 164.
 Dibenzenesulphonehydroxylamic acid, preparation of (PILOTY), A., i, 556.
 Dibenzobenzhydroxamic acid (NEF and JONES), A., i, 460.
 Dibenzodiphenylethylenediamide (FEIST and ARNSTEIN), A., i, 259.
trinitro- (FEIST and ARNSTEIN), A., i, 259.
 Dibenzodithiazole, preparation of (HOFMANN LECTURE), T., 713.
 Dibenzoethylenediamine (LADENBURG), A., i, 201.
 Dibenzohexamethylenediamide (CURTIUS and CLEMM), A., i, 464.
 Dibenzo- α -hydroxy- $\alpha\beta$ -diphenylethylamide (SÖDERBAUM), A., i, 484.
 Dibenzo-*iso*-hydroxydiphenylethylamide (SÖDERBAUM), A., i, 484.
 Dibenzomalonediamidoxime (SCHMIDTMANN), A., i, 458.
 Dibenzophenylethylenediamine (GABRIEL and STELZNER), A., i, 121.
 Dibenzoxydiphenylmethane (MACKENZIE), T., 992; P., 1896, 117.
 2:5-Dibenzo-*m*-xylylenediamide (KLAGES), A., i, 291.
 4-chloro- (KLAGES), A., i, 291.
 α -Dibenzoylacetylmethane (CLAISEN and FALK), A., i, 558.
 benzoate of, and its anilide (CLAISEN and FALK), A., i, 560.
 β -Dibenzoylacetylmethane (CLAISEN and FALK), A., i, 558.
 2:3-Dibenzoylbenzoic acid (GRAEBE and LEONHARDT), A., i, 437.
 2:6-Dibenzoylbenzoic acid (GRAEBE and LEONHARDT), A., i, 437.
 Dibenzoylbisphenylmethylpyrazolone (AUTENRIETH), A., i, 627.
 identity of, with Nef's benzoylphenylbenzoylmethylpyrazolone (AUTENRIETH), A., i, 700.
 Dibenzoyl-*n*-dihydro- β -phenotriazine (PINNOW and SÄMANN), A., i, 366.
 Dibenzoyldihydroxymaleic anhydride. See Dihydroxymaleic anhydride, dibenzoyl derivative of.
 Dibenzoylglyceric acid, methylic salt, rotatory powers of solutions of, in benzene, ethylene dibromide, nitrobenzene, and acetic acid (FRANKLAND and PICKARD), T., 127, 130, 131, 133; P., 1896, 11.
 freezing points of solutions of, in benzene, ethylene dibromide, nitrobenzene, and acetic acid (FRANKLAND and PICKARD), T., 125, 127, 129, 131, 132; P., 1896, 11.
 Dibenzoylglyceric acid (active), methylic, ethylic, and propylic salts, rotatory power of the (FRANKLAND and MACGREGOR), T., 104; P., 1896, 9.
 (inactive), methylic salt (FRANKLAND and MACGREGOR), T., 106; P., 1896, 9.
 Dibenzoylmesitylene, behaviour of, towards hydroxylamine and phenylhydrazine (BAUM), A., i, 222.
 Dibenzoyl-3-methylindazole, 1-amino- (GABRIEL and STELZNER), A., i, 320.
 Dibenzoylphenolphthalein (BISTRZYKI and NENCKI), A., i, 237.
 Dibenzoylphenylacetic acid and its silver salt (JAPP and LANDER), T., 741; P., 1895, 146.
 Dibenzoylphenylmethane (JAPP and LANDER), T., 742; P., 1895, 146.
 Dibenzoylisopyrazinequinone. See Hippuroflavin.
 Dibenzoyltartaric acid, rotatory powers of the methylic and ethylic salts of (FRANKLAND and WHARTON), T., 1585; P., 1896, 186.
 Dibenzyl, magnetic rotatory power, &c., of (PERKIN), T., 1085, 1086, 1195, 1242.
 Dibenzylacetic acid, *op*-dinitro- (REISSERT), A., i, 371.
 Dibenzylacetoacetic acid, *o*-dinitro-, ethylic salt of (REISSERT), A., i, 371.
 Dibenzylamine, magnetic rotatory power, &c., of (PERKIN), T., 1103, 1208, 1245.
 partial oxidation of (DE HAAS), A., i, 122.
 Dibenzylbenzidine, *o*-dinitro-, and its sulphate, dinitroso- and diformyl derivatives (TROEGER and EGGERT), A., i, 563.
 Dibenzyleyanacetamide (ERRERA), A., i, 528.
 Dibenzyleyanoacetic acid, *o*-dinitro-, ethylic salt of (REISSERT), A., i, 371.
 Dibenzylhydantoin, α -tetrabromo- (ERRERA), A., i, 529.
 α -Dibenzylhydantoin and its dinitro-derivative (ERRERA), A., i, 528.
 Dibenzylhydrazine, symmetrical: its hydrochloride, pierate, acetyl, benzoyl, and nitroso-derivatives, with the product of its oxidation (CURTIUS and QUEDENFELDT), A., i, 29.
 Dibenzylidenediaminopentamethylene-tetramine (DUDEN and SCHARFF), A., i, 123.
 2:6-Dibenzylidenecyclohexanone

- (*dibenzylideneketohexamethylene*) (VORLÄNDER and HOBOMM), A., i, 604; (PETRENKO-KRITSCHENKO and ARZIBASCHEFF), A., i, 671.
- Dibenzylidenemethylcyclohexenone (WALLACH), A., i, 572.
- Dibenzylidenemethylcyclopentenone (WALLACH), A., i, 573.
- Dibenzylidenecyclopentanone (*dibenzylideneketopentamethylene*) (VORLÄNDER and HOBOMM), A., i, 604.
- Dibenzylidene-*o*-phenylenediamine (HINSBERG and KÖLLER), A., i, 537.
- Dibenzylidenesuberone (WALLACH), A., i, 573.
- Dibenzylidenetriacetophenone (v. KOSTANECKI and ROSSBACH), A., i, 551.
- Dibenzylmalonic acid, nitrile of (ERRERA), A., i, 528.
- op*-dinitro-, ethylic salt of (REISERT), A., i, 371.
- Dibenzylloxyquinol, *die*chloro- (JACKSON and OENSLAGER), A., i, 294.
- Dibenzylloxyquinone, *die*chloro- (JACKSON and OENSLAGER), A., i, 294.
- Dibenzylphosphine, preparation of (HOFMANN LECTURE), T., 682.
- Dibenzylpiperazine and its salts (GABRIEL and STELZNER), A., i, 702.
- Dibenzyltetrazole, β -amino- (THIELE and INGLE), A., i, 109.
- Diisobutaldehyde (URBAIN), A., i, 590.
- Diisobutyl diketone (*iso-divaleryl*), refraction equivalent of (ANDERLINI), A., ii, 229.
- Diisobutyl ketone, refraction equivalent of (ANDERLINI), A., ii, 229.
- Dibutylamine, chloro- (BERG), A., i, 9.
- Diisobutylamine, partial oxidation of (DE HAAS), A., i, 122.
- Diisobutylaminechlorarsine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisobutylaminechloroborine (MICHAELIS and LUXEMBOURG), A., i, 344.
- Diisobutylaminechlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisobutylaminechlorosilicene (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisobutylamineoxychlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisobutylaminethiochlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diisobutylaminoacetone (STOERMER and POGGE), A., i, 408.
- hydrochloride, hydrobromide, and hydriodide (STOERMER and POGGE), A., i, 408.
- Diisobutylaminoacetone, methiodide of (STOERMER and POGGE), A., i, 408.
- semicarbazone of (STOERMER and POGGE), A., i, 408.
- Dibutylloxamide (BERG), A., i, 8.
- Dibutyl, refraction equivalent of (ANDERLINI), A., ii, 229.
- ψ -Dibutyl-*o*-cyanobenzyl cyanide (ALBAHARY), A., i, 699.
- Dicarbamide (CURTIUS), A., i, 340.
- hydrazine salt (CURTIUS and HEIDENREICH), A., i, 143.
- Dicarboxybenzoïn. See Benzoïn-dicarboxylic acid.
- Dicarboxyphenylglyoxylic acid, salts of (GRAEBE and BOSSEL), A., i, 436.
- phenylhydrazone of (GRAEBE and BOSSEL), A., i, 436.
- Dichlorhydrin, properties of (FLEMING), A., i, 333, 334.
- Diehlalglucose (MEUNIER), A., i, 334.
- 3 : 5-Dicinnamoyl-2 : 4-dimethylpyrrolidine (ZANETTI), A., i, 249.
- Dicinnamylidenecyclopentanone (*dicinnamylideneketopentamethylene*) (VORLÄNDER and HOBOMM), A., i, 604.
- Dicotoïn, composition of (HESSE), A., i, 60.
- Didehydroketocampholenic acid (BÉHAL and BLAISE), A., i, 56.
- Didehydrocampholenolide (BÉHAL and BLAISE), A., i, 56.
- Diduroquinone ((RÜGHEIMER and HANKEL), A., i, 687.
- acetyl and benzoyl derivatives of (RÜGHEIMER and HANKEL), A., i, 688.
- methylic, ethylic, and propylic ethers of (RÜGHEIMER and HANKEL), A., i, 688.
- Didymium oxide, new source of (PHIPSON), A., ii, 422.
- colloidal solution of (DELAFONTAINE), A., ii, 562.
- 1 : 4-Diethoxalylpiperazine (ROSDALSKY), A., i, 257.
- 2 : 4-Diethoxyacetophenone, α -*dibromo*- (SEGALLE), A., i, 613.
- β -*dibromo*- (SEGALLE), A., i, 613.
- tribromo*- (SEGALLE), A., i, 613.
- 2 : 4-Diethoxybenzoylformic acid and salts (GREGOR), A., i, 43.
- m*-Diethoxybenzene. See Resorcinol ethyl ether.
- 2 : 4-Diethoxybenzoic acid (GREGOR), A., i, 44.
- 3 : 3-Diethoxybenzophenone, 4 : 4-*dichloro*- (GATTERMANN), A., i, 173.

- 2 : 4-Diethoxybenzoylformic acid oxime (GREGOR), A., i, 44.
- Diethoxybenzylideneacetophenone.
See Phenyl diethoxystyryl ketone.
- Di-2-ethoxybenzylidenetriacetophenone (KOSTANECKI and SCHNEIDER), A., i, 614.
- Di-3-ethoxybenzylidenetriacetophenone (KOSTANECKI and SCHNEIDER), A., i, 614.
- Di-4-ethoxybenzylidenetriacetophenone (KOSTANECKI and SCHNEIDER), A., i, 614.
- Di- β -ethoxybutylamine (BOOKMAN), A., i, 200.
- β -Diethoxybutyric acid and its ethylic and sodium salts (CLAISEN), A., i, 464.
- 3 : 3-Diethoxy-4 : 4-dimethylbenzophenone (GATTERMANN), A., i, 172.
- 3 : 3-Diethoxy-4 : 4-dimethylthiobenzophenone (GATTERMANN), A., i, 172.
- 3 : 4'-Diethoxydiphenylamine, 4-amino-.
See *p*-Ethoxyphenyl-*m*-ethoxy-*p*-phenylenediamine.
- Diethoxydiphenylmethane (MACKENZIE), T., 990 ; P., 1896, 117.
- Diethoxyglyoxylic acid, orthamino- : its ethylic salt and hydrochloride (NEF), A., i, 76.
- Diethoxyiminoglyoxylic acid, ethylic salt (NEF), A., i, 76.
- 2 : 4-Diethoxymandelic acid and its silver salt (GREGOR), A., i, 44.
- Di-*p*-ethoxyphenylmalonamide (CASTELLANETA), A., i, 368.
- Di-*p*-ethoxyphenyloxamide (CASTELLANETA), A., i, 368.
- Diethoxyquinol, *dichloro*-, *dibenzoate* (JACKSON and GRINDLEY), A., i, 155.
- Diethoxyquinone, *dichloro*-, *dibenzoyl*-*diethylacetal* (JACKSON and GRINDLEY), A., i, 154.
- diethylacetal ethylic dicarbonate* (JACKSON and GRINDLEY), A., i, 155.
- tetrethylacetal* (JACKSON and GRINDLEY), A., i, 154.
- Diethoxyquinonedithylhemiacetal, *dichloro*- (JACKSON and GRINDLEY), A., i, 19.
- Diethoxyquinonedimalonic acid, ethylic salt of (JACKSON and GRINDLEY), A., i, 19.
- α -Diethoxysuccinic acid (MICHAEL and BUCHER), A., i, 85.
- ethylic salt (MICHAEL and BUCHER), A., i, 599.
- from ethylic dibromosuccinate and ethylic acetylenedicarboxylate (MICHAEL and BUCHNER), A., i, 599.
- as*-Diethoxysuccinic acid, ethylic salt, conversion of, into oxalacetic acid (MICHAEL and BUCHNER), A., i, 599.
- 4 : 4-Diethoxythiobenzophenone (GATTERMANN), A., i, 172.
- 3 : 3-Diethoxythiobenzophenone, 4 : 4-*dichloro*- (GATTERMANN), A., i, 173.
- 1 : 3 : 4-Diethoxyxylenol, *tribromo*- (AUWERS and CAMPENHAUSEN), A., i, 424.
- Diethyl diketone (*dipropionyl*), refraction equivalent of (ANDERLINI), A., ii, 229.
- Diethyl ketone, refraction equivalent of (ANDERLINI), A., ii, 229.
- heat of evaporation of (LUGININ), A., ii, 146.
- Diethylamine, discovery of (HOFMANN LECTURE), T., 661.
- partial oxidation of (DE HAAS), A., i, 122.
- Diethylaminechloroborine (MICHAELIS and LUXEMBOURG), A., i, 344.
- Diethylaminechlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diethylaminechlorosilicic (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diethylaminocoxychlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Diethylaminethiochlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- cis-exo*-Diethylaminohexahydro-*o*-toluic acid and its salts (EINHORN), A., i, 551.
- trans-exo*-Diethylaminohexahydro-*o*-toluic acid and its salts (EINHORN), A., i, 551.
- cis-exo*-Diethylaminohexahydro-*p*-toluic acid and its salts (EINHORN), A., i, 552.
- 2 : 3-Diethylaminohydroxytetrahydronaphthalene, hydrochloride, picrate, aurochloride, platinochloride, methiodide, and benzoyl derivative of ; picrate of the latter (BAMBERGER and LODIER), A., i, 99.
- Diethylaminophenol, sodium salt, colouring matter obtained from (MEYENBURG), A., i, 292.
- Diethylaminophenonaphthoxazime (MÖHLAU and UHLMANN), A., i, 168.
- Diethylaminophenonaphthoxazone (MÖHLAU and UHLMANN), A., i, 168.
- m*-Diethylaminophenylic carbonate and its salts (MEYENBURG), A., i, 292.
- exo*-Diethylamino-*o*-toluic acid and its salts (EINHORN), A., i, 551.
- exo*-Diethylamino-*p*-toluic acid and its salts (EINHORN), A., i, 551.

- Diethylaniline (HOFMANN LECTURE), T., 598.
 discovery of (HOFMANN LECTURE), T., 660.
 magnetic rotatory power, &c., of (PERKIN), T., 1099, 1100, 1208, 1244.
 melting point of (v. SCHNEIDER), A., ii, 290.
 action of ethylic bromide on (HOFMANN LECTURE), T., 663.
 sulphonation of (EVANS), P., 1895, 235.
- Diethylanemonin. See Anemonin.
- Diethyleyanoacetamide (ERRERA), A., i, 529.
- Diethyldiaminonaphthaphenoxazine, zincchloride of [$\text{NH} : \text{O} : \text{NH}_2 = 1 : 2 : 4$; $\text{NH} : \text{O} : \text{NEt}_2 = 1 : 2 : 4$] (MÖHLAU and UHLMANN), A., i, 168.
- Diethyldicarboxyglutaric acid. See Heptane-3 : 3 : 5 : 5-tetracarboxylic acid.
- Diethyldiethylenediamine, discovery of (HOFMANN LECTURE), T., 685.
- Diethylenediamine (HOFMANN LECTURE), T., 684, 685.
- Diethylenetriamine, discovery of, and its salts (HOFMANN LECTURE), T., 686.
- Diethylethylenediamine (HINSBERG and STRÜPLER), A., i, 47; (SCHNEIDER), A., i, 201.
 discovery of (HOFMANN LECTURE), T., 685.
- $\alpha\alpha_1$ -Diethylglutaric acid, anilic acid of (AUWERS and SINGHOF), A., i, 642.
 unimolecular *p*-tolil of (AUWERS and SINGHOF), A., i, 642.
 bimolecular *p*-tolil of (AUWERS and SINGHOF), A., i, 642.
p-tolilic acid of (AUWERS and SINGHOF), A., i, 642.
- $\alpha\alpha_1$ -Diethylglutaric acids, isomeric (AUWERS and SINGHOF), A., i, 642.
- $\alpha\alpha_1$ -Diethylglutaric anhydride (AUWERS and SINGHOF), A., i, 642.
- d*-Diethylhydantoin (ERRERA), A., i, 529.
- Diethylmalonic acid, ethylic salt, hydrolysis of (HJELT), A., i, 205.
- Diethylmethane. See Pentane.
- Diethyloxamic acid, ethylic salt, preparation of (HOFMANN LECTURE), T., 662.
- Diethyloxamide, preparation of (HOFMANN LECTURE), T., 662.
- Diethylphosphonic acid, preparation of (HOFMANN LECTURE), T., 682.
- Diethylpropyl- ψ -nitrole. See Heptane, δ -nitro- δ -nitroso-.
- 5 : 2-Diethylsafranine (JAUBERT), A., i, 325.
- Diffusion of metals (ROBERTS-AUSTEN), A., ii, 590.
 in mercury (HUMPHREYS), T., 243, 1679; P., 1896, 9, 220; (ROBERTS-AUSTEN), P., 1896, 219.
- Diffuoryls, α -, β -, and γ - (HODGKINSON), P., 1896, 111.
- Diformyl- α -hydroxy- $\alpha\beta$ -diphenylethylamine (SÖDERBAUM), A., i, 484.
- Difurfurylidenecyclohexanone (*difurfurylideneketohexamethylene*) (VORLÄNDER and HOBOMM), A., i, 604.
- Difurfurylidenecyclopentanone (*difurfurylideneketopentamethylene*) (VORLÄNDER and HOBOMM), A., i, 604.
- Difurfurylidenetriacetophenone (KOSTANECKI and PODRAJANSKY), A., i, 689.
- Digestion in organs after death (BIONDI), A., ii, 616.
 action of mustard and pepper on (GOTTLIEB), A., ii, 42.
 of cellulose by enzymes (GRÜSS), A., ii, 669.
 of crude fibre (HOLDEFLEISS), A., ii, 616.
 of polysaccharides and glucosides by animal secretions (FISCHER and NIEBEL), A., ii, 665.
 of cane sugar, maltose, and trehalose (BOURQUELOT and GLEY), A., ii, 315.
 gastric (SJÖQUIST), A., ii, 484.
 influence of salts on (DASTRE), A., ii, 118.
 saline, of gelatin (DASTRE and FLORESCO), A., i, 196.
- Digitalein, detection of (KELLER), A., ii, 683.
- Digitaligenin, detection of (KILIANI), A., ii, 551; (KELLER), A., ii, 683.
- Digitalin (KILIANI), A., i, 58.
 crystalline (KILIANI), A., i, 180.
 detection of (KELLER), A., ii, 683.
- "*Digitalinum verum*," detection of (KILIANI), A., ii, 551.
- Digitalis*, detection of the glucosides in (KILIANI), A., ii, 551.
- Digitogenin (KILIANI), A., i, 58.
 detection of (KILIANI), A., ii, 551.
- β -Digitogenin (KILIANI), A., i, 59.
- Digitonin (KILIANI), A., i, 58.
 detection of (KILIANI), A., ii, 551; (KELLER), A., ii, 683.
- Digitoxigenin, detection of (KILIANI), A., ii, 551.
- Digitoxin, identity of the so-called α - and β -modifications (KILIANI), A., ii, 551.

- Digitoxin, detection of (KILIANI), A., ii, 551; (KELLER), A., ii, 683.
- β -Digitoxin and its hydrolysis (KILIANI), A., i, 59.
- Digitoxose (KILIANI), A., i, 59.
- Diglucose, polyanhydride of, in *Colocasia antiquorum* (YOSHIMURA), A., ii, 60.
- Diglycollic acid, thio-, unsymmetrical homologues of (LOVÉN), A., i, 412.
- Diheptylthiocarbamide (PONZIO), A., i, 636, 637.
- Dhippenylcarbamide (CURTIUS), A., i, 38.
- Dhippurylhydrazine (CURTIUS), A., i, 37.
- p*-Dihomopiperonylpyrazine (ANGELI), A., i, 296.
- Dihydracrylic acid, thio- (thiodipropionic acid) (LOVÉN), A., i, 412.
- $\Delta^{4,6}$ -Dihydrobenzaldehyde from anhydroecgonine dibromide and from tropinone methiodide, identity of (WILLSTÄTTER), A., i, 327.
- Dihydrobenzoic acids. See *Cyclohexadienecarboxylic acids*.
- Dihydrobenzylidenetetracylhydrazine and its sodium derivative (THIELE and INGLE), A., i, 108.
- Dihydro-*m*-isobutyltoluene. See 1-Methyl-3-isobutylcyclohexadiene.
- Dihydrociscampholytamide, amine, hydrocarbon, alcohol, and ketone derived from (NOYES), A., i, 696.
- Dihydrocampholytic acid, cyano- (HOOGWERFF and VAN DORP), A., i, 314.
- Dihydrocarvone, oxidation of (WALLACH), A., i, 102.
- Dihydrocuminic acid. See 4-*iso*-Propylcyclohexadienecarboxylic acid.
- Dihydrocymene. See Methylisopropylcyclohexadiene.
- Dihydrodiduroquinone and its acetyl derivative (RÜGHEIMER and HANKEL), A., i, 688.
- Dihydrodiphenyl (KNOEVENAGEL), A., i, 289.
- Dihydrogranatone, oxidation of (CIAMICIAN and SILBER), A., i, 397.
- Dihydro-*m*-hexyltoluene. See 1-Methyl-3-hexylcyclohexadiene.
- Dihydrohippuroflavindiamide, dianilide, bismethylanilide, and di-*o*-toluidide of (RÜGHEIMER), A., i, 62.
- Dihydrolutidinedicarboxylic acid of Griess and Harrow, real nature of (SCHIFF and BROGIO), A., i, 250, 251.
- iso*-Dihydrolutidinedicarboxylic acid. See 2 : 6-Dimethyl-1 : 4-dihydropyridine-3 : 5-dicarboxylic acid.
- Dihydrophenazine hydrochloride, preparation of (HINSBERG and HIMMELSCHNEIN), A., i, 685.
- n*-Dihydro- β -phenotriazine: its salts, diacetyl and dibenzoyl derivatives (PINNOW and SÄMANN), A., i, 366.
- Dihydrophenylcoumaran (HARRIES and BUSSE), A., i, 302.
- Dihydrophthalic acid. See *cyclo*-Hexadiene-1 : 2-dicarboxylic acid.
- Dihydropolystichic acid (POULSSON), A., i, 387.
- Dihydroquinazoline (GABRIEL and STELZNER), A., i, 507.
- Dihydroresorcinol. See 1 : 3-Dihydrooxycyclohexadiene.
- iso*-Dihydrotetrazine, derivatives of (CURTIUS), A., i, 39.
- Dihydrotoluene. See Methylcyclohexadiene.
- Dihydrotoluic acids. See Methylcyclohexadienecarboxylic acids.
- Dihydroxyacetophenone (m. p. 178°) (CLAUS and HUTH), A., i, 227.
- 2 : 4-Dihydroxyacetophenone, tribromo- (SEGALLE), A., i, 613.
- dichloro- (SEGALLE), A., i, 613.
- iodo- (SEGALLE), A., i, 613.
- Dihydroxyaposafranone (FISCHER and HEPP), A., i, 324.
- 1 : 3-Dihydroxybenzene. See Resorcinol.
- Dihydroxybenzophenone (? m. p. 127°) (GRAEBE and ULLMANN), A., i, 440.
- Di-o*-hydroxybenzylidenediaminopentamethylenetetramine (DUDEN and SCHARFF), A., i, 123.
- Dihydroxybutane, tertiary (HENRY), A., i, 4.
- α -Dihydroxydihydrocampholenic acid, distillation of (TIEMANN), A., i, 248.
- Dihydroxydimethyladipic acids, stereoisomeric (ZELINSKY and ISAJEFF), A., i, 413.
- Dihydroxydimethylglutaric acid (AUWERS and SINGHOF), A., i, 642.
- Dihydroxydiphenylaminocarboxylic acid, dibromo- [NH : Br₂ : OH = 1 : 3 : 5 : 4; NH : OH : COOH = 1 : 4 : 3] (MÖHLAU and UHLMANN), A., i, 167.
- Di-*o*-hydroxydiphenylcarbamide (STRUVE and RADENHAUSEN), A., i, 36.
- Di-*m*-hydroxydiphenylcarbamide (STRUVE and RADENHAUSEN), A., i, 36.
- Di-*p*-hydroxydiphenylcarbamide (STRUVE and RADENHAUSEN), A., i, 36.
- Dihydroxydiphenylglutaric acid (JAPP and LANDER), P., 1896, 108.

- 1 : 2-Dihydroxyflavone and its acetyl compound (FRIEDLÄNDER and RÜDT), A., i, 410.
 acid compounds of (PERKIN), T., 1443; P., 1896, 167.
 constitution of (KESSELKAUL and KOSTANECKI), A., i, 606.
 Dihydroxyfumaric acid. See Dihydroxymaleic acid.
 Dihydroxycyclohexadiene (*dihydroresorcinol*), synthesis and hydrolysis of (VORLÄNDER), A., i, 20.
 2 : 8-Dihydroxyhexahydrocymene. See Dihydroxymethylisopropylcyclohexane.
 $\alpha\beta$ -Dihydroxyisohexoic acid (BRAUN), A., i, 594.
 Dihydroxyhydrolapachol, action of sulphuric acid on (HOOKER), T., 1368.
 Dihydroxylamine hydriodide (DUNSTAN and GOULDING), T., 841; P., 1896, 73.
 Dihydro-*m*-xylene. See 1 : 3-Dimethylhexadiene.
 Dihydroxymaleic acid (FENTON), T., 547; P., 1896, 67.
 constitution of (FENTON), T., 556.
 isomeric form of (FENTON), T., 557.
 α - and β -modifications (FENTON), T., 560.
 action of acetic anhydride, chloride, and benzoic chloride on (FENTON), T., 550, 551, 552; P., 1896, 68.
 action of aniline on (FENTON), T., 552.
 action of bromine on (FENTON), T., 547.
 action of ethylic bromide on (FENTON), T., 554.
 action of hydrogen bromide, chloride, and iodide on (FENTON), T., 547, 553, 555, 558; P., 1896, 68.
 action of hydroxylamine and phenylhydrazine on (FENTON), T., 548, 549; P., 1896, 68.
 action of water on (FENTON), T., 547.
 Dihydroxymaleic acid, aniline salts (FENTON), T., 551, 552.
 diethylic salt (FENTON), T., 554.
 behaviour of, with dehydrating agents (FENTON), T., 555.
 action of phenylhydrazine and hydroxylamine on (FENTON), T., 549; P., 1896, 68.
 dimethylic salt, diacetyl derivative (FENTON), T., 550.
 action of acetic chloride, of phenylhydrazine, and hydroxylamine on (FENTON), T., 549; P., 1896, 68.
 phenylhydrazine salt, and action of heat on (FENTON), T., 548; P., 1896, 68.
 Dihydroxymaleic anhydride, diacetyl and dibenzoyl derivatives of (FENTON), T., 551.
 1 : 3 : 1'-Dihydroxymethylantracene. See Methylpurpuroxanthin.
 4 : 4'-Dihydroxy-2-methyldiphenyl (JACOBSON and NANNINGA), A., i, 93.
 3 : 5 : 1-Dihydroxymethylcyclohexadiene (*m-methyldihydroresorcinol*) and its dioxime (KNOEVENAGEL), A., i, 289.
 2 : 3-Dihydroxy-1-methylphenazine (KEHRMANN and TIKHVINSKY), A., i, 511.
 Dihydroxymethylisopropylcyclohexane (2 : 8-*dihydroxyhexahydrocymene*), 1 : 6-*dibromo*- (WALLACH), A., i, 571.
 1 : 3-Dihydroxynaphthalene, acetyl derivative of (FRIEDLÄNDER and RÜDT), A., i, 569.
 1 : 3-Dihydroxynaphthalene-3'-sulphonic acid, sodium salt (FRIEDLÄNDER and RÜDT), A., i, 569.
 2 : 4-Dihydroxynaphthalene, 1-amino- (KEHRMANN and HERTZ), A., i, 567.
 1 : 2'-Dihydroxynaphthalene, from 1 : 2' : 2-dihydroxynaphthoic acid (FRIEDLÄNDER and ZINBERG), A., i, 244.
 Dihydroxy- β -naphthaquinone, discovery of (HOFMANN LECTURE), T., 621.
 1 : 2 : 3-Dihydroxynaphthoic acid, methylic and ethylic salts (MÖHLAU and KRIEBEL), A., i, 242.
 1 : 2' : 2-Dihydroxynaphthoic acid, barium salt (FRIEDLÄNDER and ZINBERG), A., i, 244.
 1 : 3 : 5-Dihydroxyphenylcyclohexane (*m-phenylhexahydroresorcinol*) (KNOEVENAGEL), A., i, 289.
 Di-*p*-hydroxyphenylmalonamide and its diacetyl derivative (CASTELLANETA), A., i, 368.
 Di-*p*-hydroxyphenyloxamide and its diacetyl derivative (CASTELLANETA), A., i, 368.
 1 : 2-Dihydroxyphenyl-*p*-phenylsulphone (HINSBERG and HIMMELSCHNEID), A., i, 685.
 1 : 4-Dihydroxyphenylsulphone, preparation of (HINSBERG and HIMMELSCHNEID), A., i, 685.
 Dihydroxyphyllporphyrin (SCHUNCK and MARCHLEWSKI), A., i, 496.
 2 : 6-Dihydroxypyridine-4-carboxylic acid. See Citrazinic acid.
 3 : 4-Dihydroxyquinoline, 1 : 2-*dichloro*-, and its hydrochloride (ZINCKE and WEIDERHOLD), A., i, 501.

- 1 : 2'-Dihydroxyquinoline: its hydrochloride and acetyl derivatives (DIAMANT), A., i, 105.
- 3 : 4'-Dihydroxyquinoline and its aurochloride (HIRSCH), A., i, 626.
- Dihydroxyquinone, condensation of, with ethyl-*o*-phenylenediamine and phenyl-*o*-phenylenediamine (KEHRMANN and FÜHNER), A., i, 511.
- Dihydroxystearic acid, separation of, into its optically active constituents (FREUNDLER), A., i, 596.
- d*-Dihydroxystearic acid, ethylic salt (FREUNDLER), A., i, 596.
- l*-Dihydroxystearic acid, ethylic salt (FREUNDLER), A., i, 596.
- strychnine salt (FREUNDLER), A., i, 596.
- 1 : 2' : 4 : 2-Dihydroxysulphonaphthoic acid, sodium hydrogen, and hydrogen aniline salts (FRIEDLÄNDER and ZINBERG), A., i, 244.
- Dihydroxytetramethylstilbene, *tetra*-bromo- (AUWERS and MARWEDEL), A., i, 150; (AUWERS and AVERY), A., i, 151; (AUWERS and HOFF), A., i, 422.
- bromide (AUWERS and HOF), A., i, 422.
- ethyl ether (AUWERS and MARWEDEL), A., i, 150.
- Dihydroxytetraphenylethanedicarboxylic acid, dilactone of (ULLMANN), A., i, 563.
- Dihydroxytoluquinone, condensation of, with *o*-phenylenediamine and phenyl-*o*-phenylenediamine (KEHRMANN and FÜHNER), A., i, 512.
- Dihydroxytrimethylglutaric acid, preparation of (ZELINSKY and TSCHUGAEW), A., i, 135.
- action of lead on (ZELINSKY and TSCHUGAEW), A., i, 135.
- Dihydroxytropidine, oxidation of (WILLSTÄTTER), A., i, 65.
- γ -Diketochloropyrhydrindone, β -*dichloro*- (ZINCKE and WINZHEIMER), A., i, 501.
- Diketone, $C_6H_8O(?)$, from quercitol (KILIANI and SCHÄFER), A., i, 586.
- Diketopiperazine, molecular symmetry of (GROTH), A., ii, 159.
- γ -Diketopyrhydrindene, β -*dichloro*-, and its platinochloride (ZINCKE and WINZHEIMER), A., i, 500.
- : 2-Diketoquinolinephenazine, hydrate of (ZINCKE and WIEDERHOLD), A., i, 502.
- Diketotetrahydroquinazoline-2-carboxylic acid and its salts (NIEMEN-TOWSKI), A., i, 578.
- Dilactylamide (LOVÉN), A., i, 412.
- Dilactylic acids, thio-, stereoisomeric (LOVÉN), A., i, 412.
- "Dilute coloration" of minerals (WEINSCHENK), A., ii, 654.
- Dimesityldinitrosacyl (BAUM), A., i, 222.
- 2 : 4-Dimethoxybenzaldehyde (BOUVEAULT), A., i, 649.
- o*-Dimethoxybenzene, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1135, 1159, 1188, 1240.
- m*-Dimethoxybenzene, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1159, 1187, 1240.
- p*-Dimethoxybenzene, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1136, 1188, 1240.
- 3 : 4-Dimethoxybenzoic acid, 2-cyano- (HOOGWERFF and VAN DORP), A., i, 315.
- 2 : 3-Dimethoxybenzoic acid, 6-cyano- (HOOGWERFF and VAN DORP), A., i, 315.
- 3 : 3-Dimethoxybenzophenone, 4 : 4-*di*-bromo- (GATTERMANN), A., i, 173.
- 4 : 4-*dichloro*- (GATTERMANN), A., i, 173.
- 3 : 3-Dimethoxy-4 : 4-dimethylthio-benzophenone (GATTERMANN), A., i, 173.
- Dimethoxydiphenylmethane (MACKENZIE), T., 987; P., 1896, 117.
- β -*m*-Dimethoxydiphenyloxazole and its salts (MINOVICI), A., i, 704.
- Di-*p*-methoxyphenylmalonamide (CASTELLANETA), A., i, 368.
- Di-*p*-methoxyphenyloxamide (CASTELLANETA), A., i, 368.
- Dimethoxyquinol, *dichloro*-, dibenzoate, oxide of (JACKSON and GRINDLEY), A., i, 155.
- 3 : 4'-Dimethoxyquinoline (HIRSCH), A., i, 626.
- Dimethoxyquinone, *dibromo*-, dimethylhemiacetal (JACKSON and GRINDLEY), A., i, 156.
- dichloro*-, dibenzoyldimethylacetal (JACKSON and GRINDLEY), A., i, 155.
- diethylhemiacetal (JACKSON and GRINDLEY), A., i, 19.
- dimethylhemiacetal (JACKSON and GRINDLEY), A., i, 19.
- 3 : 3-Dimethoxythiobenzophenone, 4 : 4-*dibromo*- (GATTERMANN), A., i, 173.
- 4 : 4-*dichloro*- (GATTERMANN), A., i, 173.
- 4 : 4-Dimethoxythiobenzophenone (GATTERMANN), A., i, 172.
- Dimethoxytriphenylcarbinolcarboxylic acid (GRANDE), A., i, 564.

Dimethoxytriphenylmethanecarboxylic acid and its salts (GRANDE), A., i, 564.
dibromo- (GRANDE), A., i, 564.
 Dimethoxy-1 : 3 : 4-xyleneol, *tribromo-* (AUWERS and CAMPENHAUSEN), A., i, 424.
 Dimethylacetoacetic acid, ethylic salt, action of ethylic bromacetate on (PERKIN and THORPE), P., 1896, 156.
 Dimethylacetylacetone, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1237.
 $\beta\beta$ -Dimethylacrylic acid. See Pentenoic acid.
 Dimethylisoallylene. See Pentinene.
 Dimethylallylthiocarbamide dibromide (GADAMER), A., i, 140.
 See also μ -Dimethylpenthiazoline, γ -bromo-
 chlorobromide (GADAMER), A., i, 140.
 compounds of, with inorganic salts (GADAMER), A., i, 141.
 Dimethylamine, behaviour of, with Nessler's reagent (DELÉPINE), A., i, 589.
 partial oxidation of (DE HAAS), A., i, 122.
 dibromide (REMSSEN and NORRIS), A., i, 337.
 hydrochloride and pierate (DELÉPINE), A., i, 589.
 Dimethylamine, *diamino-*, tribenzoyl derivative of (DUDEN and SCHARFF), A., i, 124.
 thio- (SCHENCK), A., i, 427.
 Dimethylaminoacetone (STOERMER and POGGE), A., i, 408.
 Dimethylaminobenzenyl- β -naphthyl-imidine: its hydriodide and pierate (VON PECHMANN), A., i, 31.
 Dimethylaminobenzenylphenylimidine: its hydriodide and pierate (VON PECHMANN), A., i, 32.
 4-Dimethylaminodiphenazone, 4-bromo- [$N : Br_2 : O = 1 : 3 : 5 : 4$; $N : NMe_2 = 1 : 4$] (MÖHLAU and UHLMANN), A., i, 166.
 Dimethylaminoformic acid, methylic salt, action of nitric acid on (FRANCHIMONT), A., i, 602.
 α -Dimethylaminohexoic acid (DUVILLIER), A., i, 80.
 2 : 3-Dimethylaminohydroxytetrahydronaphthalene, hydrochloride, pierate, aurochloride, platinochloride, methiodide, and benzoyl derivative of (BAMBERGER and LODTER), A., i, 99.
 Dimethyldiaminonaphthaphenoxazine, zincchloride of [$NH : O : NH_2 =$

$1 : 2 : 4$; $NH : O : NMe_2 = 1 : 2 : 4$] (MÖHLAU and UHLMANN), A., i, 167.
 Dimethylaminophenonaphthoxazine [$NE : O : NH = 1 : 2 : 4$; $N : O : NMe_2 = 1 : 2 : 4$] and its hydrochloride (MÖHLAU and UHLMANN), A., i, 167.
 Dimethylaminophenonaphthoxazone [$N : O : O = 1 : 2 : 4$; $N : O : NMe_2 = 1 : 2 : 4$] and its hydrochloride (MÖHLAU and UHLMANN), A., i, 168.
m-Dimethylaminophenylic carbonate and its salts (MEYENBURG), A., i, 292.
 Dimethylaminophenylphthalide (EBERT), A., i, 441.
 Dimethylanemonin. See Aneinonin.
 Dimethylaniline, preparation of (HORMANN LECTURE), T., 624, 625.
 magnetic rotatory power, &c., of (PERKIN), T., 1064, 1099, 1100, 1108, 1156, 1207, 1232, 1244.
 condensation of, with *o*-phthalaldehydic acid (EBERT), A., i, 441.
 sulphonation of (EVANS), P., 1895, 235.
 hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1110, 1158, 1218, 1220, 1221, 1235, 1246.
 derivative of bromo- ψ -cumenol. See ψ -Cumenol.
 Dimethylaniline, α -diamino- (SCHUSTER and PINNOW), A., i, 427.
 p-bromo- and silicon chloroform, or silicon tetrachloride, action of sodium on (COMBES), A., i, 417.
 tetrabromo- (EVANS), P., 1895, 235, 236.
 β -dinitro- (SCHUSTER and PINNOW), A., i, 427.
 2 : 4-dinitro- (EVANS), P., 1895, 236.
 nitroso-, behaviour towards benzenesulphonic chloride (BÖRNSTEIN), A., i, 541.
 compound of, with 1 : 3 : 5-tribromophenol (EDELEANU and ENESCU), A., i, 359.
 compound of, with 1 : 3 : 5-trichlorophenol (EDELEANU and ENESCU), A., i, 359.
 compound of, with trichlororesorcinol (EDELEANU and ENESCU), A., i, 360.
 Dimethylaniline-*m*-sulphonic acid, *p*-bromo- (EVANS), P., 1895, 236.
 dibromo- (EVANS), P., 1895, 236.
 dinitro- (EVANS), P., 1895, 236.
 Dimethylaniline-*p*-sulphonic acid, preparation of (EVANS), P., 1895, 235.
 bromo-, and its dibromide (EVANS), P., 1895, 235.
 o-nitro- (EVANS), P., 1895, 236.
 Dimethylanilinodibenzoyldihydroxy-

- nn*-dihydropyrazine. See Dihydrohippuroflavin, bismethylanilide of.
- Dimethylapionol and its acetate (CIAMICIAN and SILBER), A., i, 608.
- Dimethylapionolcarboxylic acid (CIAMICIAN and SILBER), A., i, 608.
- 1:3'-Dimethylazobenzene (JACOBSON, MICHAELIS, and NANNINGA), A., i, 98.
- 2:4-Dimethylazobenzene (JACOBSON, MICHAELIS, and NANNINGA), A., i, 97.
- Dimethylazammoniumbenzoic acid, chloride of, and its platinochloride (ZINCKE and HELMERT), A., i, 550.
- betaine of (ZINCKE and HELMERT), A., i, 550.
- Dimethylbarbituric acid, bromonitro- (ANDREASCH), A., i, 89.
- chloronitro- (ANDREASCH), A., i, 89.
- nitro-, action of alkalis on (ANDREASCH), A., i, 89.
- 2:4-Dimethylbenzaldehyde (BOUVEAULT), A., i, 649.
- Dimethylbenzoic acids. See Mesitylenic acid; Xylic acids.
- Dimethylbenzoylpropionic acid (MUHR), A., i, 231.
- Dimethylbenzoylpropionic acid (MUHR), A., i, 231.
- Dimethylbenzoylpropionic acid (MUHR), A., i, 231.
- α -Dimethylecyanosuccinic acid, ethylic salt (BONE and PERKIN), T., 259; P., 1896, 63.
- Dimethylcarballylic acid, cyano-, hydrolysis of ethylic salt (ZELINSKY and TSCHERNOSWITOFF), A., i, 281.
- Dimethylecyanacetamide (ERRERA), A., i, 529.
- Dimethylecyanuric acid (SCHIFF), A., i, 530.
- Dimethyldiacetylpyrone (VAILLANT), A., i, 591.
- Dimethyldiethylammonium iodide, preparation of (HOFMANN LECTURE), T., 670.
- :6-Dimethyl-1:4-dihydropyridine-3-carboxylic acid: its hydrochloride and platinochloride and ethylic salt (SCHIFF and ROSIO), A., i, 250.
- :6-Dimethyl-1:4-dihydropyridine-3:5-dicarboxylic acid: its ethylic salt and nitroso-derivative (SCHIFF and ROSIO), A., i, 251.
- :2-Dimethyl-4:5-diphenylhexamethylene. See Dimethyldiphenylcyclohexane.
- Dimethyldipropylene- ψ -hydrazodicarbothiamide (FREUND and HEILBRUN), A., i, 416.
- Dimethylene compound from *o*-aminobenzylphenylhydrazine and form-aldehyde (BUSCH), A., i, 508.
- Dimethylenegluconic acid and its salts (HENNEBERG and TOLLENS), A., i, 645.
- Dimethylethylcarbamide, sodium derivative, molecular weight of (BECKMANN and SCHLEIBS), A., i, 124.
- Dimethylethylcarbinol. See Amylic alcohols.
- Dimethylethylenediamine (SCHNEIDER), A., i, 200.
- Dimethylethylenedinitrosamine (SCHNEIDER), A., i, 201.
- Dimethylethylsuccinic acid, electrical conductivity of (AUWERS and SCHLOSSER), A., i, 639.
- p*-Dimethylethyloctohydronaphthalene, formation of, from santonin (ANDREOCCI), A., i, 183.
- Dimethylfumaric acid (*methylmesaconic acid*) (FITTIG), A., i, 599.
- anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.
- Dimethylfraxetin (BIGINELLI), A., i, 370.
- Dimethylgentisaldehyde, preparation of (BOUVEAULT), A., i, 649.
- $\beta\beta$ -Dimethylglutaranil (PERKIN), T., 1476.
- $\alpha\beta$ -Dimethylglutaranilic acid (MONTMARTINI), A., i, 667.
- $\beta\beta$ -Dimethylglutaranilic acid (PERKIN), T., 1476; P., 1896, 170.
- $\alpha\beta$ -Dimethylglutaranilide (MONTMARTINI), A., i, 667.
- $\alpha\alpha$ -Dimethylglutaric acid (REFORMATSKY), A., i, 206.
- (fumaroid) cyclic ethylenic salt of (AUWERS and SINGHOF), A., i, 641.
- cyclic methylenic salt of (AUWERS and SINGHOF), A., i, 641.
- $\alpha\alpha_1$ -Dimethylglutaric acids, resolution of a mixture of (BONE and PERKIN), T., 268; P., 1896, 63.
- $\alpha\beta$ -Dimethylglutaric acid (MONTMARTINI), A., i, 667.
- $\beta\beta$ -Dimethylglutaric acid and salts (PERKIN and GOODWIN), T., 1473; P., 1896, 170.
- high dissociation constant of (PERKIN), T., 1461.
- action of acetic anhydride on (PERKIN and GOODWIN), T., 1475.
- ethylic salt (PERKIN and GOODWIN), T., 1475.
- $\alpha\alpha_1$ -Dimethylglutaric anhydride, hydrolysis of (AUWERS and SINGHOF), A., i, 641.

- $\alpha\alpha_1$ -Dimethylglutaric anhydride, *dibromo-*, action of aniline on (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
 action of bases on (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.
 action of caustic soda on (AUWERS and SINGHOF), A., i, 642.
- $\alpha\beta$ -Dimethylglutaric anhydride (MONTMARTINI), A., i, 667.
- $\beta\beta$ -Dimethylglutaric anhydride (PERKIN and GOODWIN), T., 1475; P., 1896, 170.
 action of aniline on (PERKIN), T., 1476.
- $\alpha\alpha_1$ -Dimethylglutaric-*p*-tolil, unimolecular (AUWERS and SINGHOF), A., i, 641.
 bimolecular (AUWERS and SINGHOF), A., i, 641.
- Dimethylglyoxime and its peroxide (RIMINI), A., i, 276.
- 1 : 3-Dimethylcyclohexadiene (*dihydro-m-xylene*) (KNOEVENAGEL), A., i, 288.
- 1 : 3-Dimethylcyclohexane (*hexahydro-m-xylene*) from camphopyric acid (MARSH and GARDNER), T., 84; P., 1895, 206.
- 1 : 2-Dimethylcyclohexane-4-carboxylic acid (*hexahydro-p-xylic acid*) and its ethylic salt, chloride, and anilide (BENTLEY and PERKIN), P., 1896, 79.
 bromo-, ethylic salt of (BENTLEY and PERKIN), P., 1896, 79.
- 2 : 5-Dimethylhexane-3-ol-4-one and its oxime (URBAIN), A., i, 590.
- 1 : 3-Dimethylcyclohexanone (NOYES), A., i, 696.
- 3 : 4-Dimethylcyclohexenecarboxylic acid (*tetrahydro-p-xylic acid*) [$\text{Me}_2 : \text{COOH} = 4 : 3 : 1$] (BENTLEY and PERKIN), P., 1896, 79.
 dibromide (BENTLEY and PERKIN), P., 1896, 79.
- 1 : 3-Dimethylcyclohexenol-5 and its dibromide, acetyl derivative, and urethane (KNOEVENAGEL), A., i, 287.
- Dimethylhomocatechol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1135, 1188, 1240.
- α -Dimethylhydantoin (ERRERA), A., i, 529.
- 2 : 4-Dimethylhydrazobenzene (JACOBSON, MICHAELIS, and NANNINGA), A., i, 98.
- 4 : 3'-Dimethylhydrazobenzene (JACOBSON, MICHAELIS, and NANNINGA), A., i, 98.
- Dimethylindirubin (SCHUNCK and MARCHLEWSKI), A., i, 96.
- 1 : 3-Dimethylketopentamethylene. See 1 : 3-Dimethylcyclopentanone.
- $\alpha\alpha$ -Dimethyllevulinic acid, nitrile of, hydrolysis of (AUWERS and ZIEGLER), A., i, 643.
- Dimethylmaleic acid (*pyrocinchonic acid*), isomerides of (FITTIG), A., i, 599.
- Dimethylmaleic anhydride (BISCHOFF), A., i, 469, 470.
- Dimethylmalonamide and the biuret reaction (SCHIFF), A., i, 632.
- Dimethylmalonic acid (*iso-succinic acid*) (JUST), A., i, 404.
 methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
 ethylic salt, hydrolysis of (HJELT), A., i, 205.
- Dimethylmalonimide, oxime of (ANDREASCH), A., i, 89.
 bromonitro- (ANDREASCH), A., i, 89.
 chloronitro- (ANDREASCH), A., i, 89.
 nitro- (ANDREASCH), A., i, 89.
 action of halogens on (ANDREASCH), A., i, 89.
- 1 : 4-Dimethylnaphthalene and its picrate (CANNIZZARO and ANDREOCCI), A., i, 488.
 2-nitroso- (CANNIZZARO and ANDREOCCI), A., i, 489.
 bisnitroso-, acetyl derivative (CANNIZZARO and ANDREOCCI), A., i, 489.
- 3 : 3'-Dimethylnaphthalene, from 2-acetyl-1 : 1'-dihydroxy-3 : 3'-dimethylnaphthalene, and its oxidation (COLLIE and WILLSMORE), T., 298; P., 1896, 47.
- 1 : 4-Dimethylnaphthaquinonepropionic acid (ANDREOCCI), A., i, 183.
- 1 : 4 : 2-Dimethylnaphthol from the santonic acids (ANDREOCCI), A., i, 185; (CANNIZZARO and ANDREOCCI), A., i, 488.
 oxy-, phenylhydrazone, oxime, and acetyl derivative of (CANNIZZARO and ANDREOCCI), A., i, 489.
- 1 : 4 : 2-Dimethylnaphthylamine, from nitrosodimethylnaphthalene (CANNIZZARO and ANDREOCCI), A., i, 489.
 acetyl and formyl derivatives, hydrochloride, platinochloride, and sulphate (CANNIZZARO and ANDREOCCI), A., i, 488.
- Dimethylnitramine (FRANCHIMONT and VAN ERP), A., i, 298.
 action of fused potash on (VAN ERP), A., i, 276.
- 2 : 6-Dimethyl-2 : 7-octadiene-6-ol. See Methylallylhexenylearbinol.
- 2 : 6-Dimethyloctan-3-oleic acid, silver

- salt, and lactone (VON BAEYER), A., i, 247.
- 2 : 6-Dimethyloctan-3-onoic acid : its semicarbazone (VON BAEYER), A., i, 247.
- Dimethyloxamide, action of nitric acid on (FRANCHIMONT), A., i, 602.
- dinitro- (THIELE and MEYER), A., i, 407.
- 2 : 5-Dimethyloxazole and its hydrochloride, platinochloride, aurochloride, and mercuriochloride (SCHUFTAN), A., i, 262.
- 2 : 6-Dimethyl-3-oximidocetic acid, melting point of (VON BAEYER), A., i, 247.
- 3-Dimethylcyclopentane (1 : 3-dimethylpentamethylene) (ZELINSKY and RUDSKY), A., i, 286.
- 3-Dimethylcyclopentanol (ZELINSKY and RUDSKY), A., i, 286.
- 3-Dimethylcyclopentanone (ZELINSKY and RUDSKY), A., i, 286.
- Dimethylpenthiazoline, γ -bromo-, probable identity of, with dimethylallylthiocarbamide dibromide (DIXON), T., 854; P., 1896, 100.
- 6-Dimethylpiperidine-3 : 5-dicarboxylic acid (SCHIFF and PROSIO), A., i, 250.
- Dimethylpropanetricarboxylic acid. See Pentanetricarboxylic acids.
- Dimethylpropylcarbinol. See Hexylic alcohols.
- Dimethylisopropylcarbinol. See Hexylic alcohols.
- Dimethylisopropylethylene. See Heptylenes.
- Dimethylpropyl- ψ -nitrole. See *iso*-Pentane, β -nitro- β -nitroso-.
- Dimethylpropylsuccinic acid, electrical conductivity of (AUWERS and SCHLOSSER), A., i, 639.
- Dimethylprotocatechuic acid, existence of, in *Cratægus oxyacantha* (PERKIN and HUMMEL), T., 1571; P., 1896, 186.
- 4-Dimethylpyrazolone-4-carboxylic acid (RUHEMANN), A., i, 505.
- 6-Dimethylpyridine-3 : 5-dicarboxylic acid (*lutidinedicarboxylic acid*), ethylic salt and its picrate (SCHIFF and PROSIO), A., i, 250.
- 6-Dimethylpyridine-4 : 5-dicarboxylic acid from hydroxytrimethylisoquinoline (COLLIE and WILLMORE), T., 303; P., 1896, 47.
- 4-Dimethylpyrrolone, 3 : 5-diacetyl and 3 : 5-dicinnamoyl derivatives of (ZANETTI), A., i, 249.
- Dimethylquinol. See *p*-Dimethoxybenzene.
- Dimethylresorcinol. See *m*-Dimethoxybenzene.
- 5 : 2'-Dimethylsafranine and its diethyl derivative (JAUBERT), A., i, 325.
- p*-Dimethylstilbene, preparation of (BOUVEAULT), A., i, 650.
- $\alpha\alpha$ -Dimethylsuccinanil (AUWERS and SCHLOSSER), A., i, 640.
- $\alpha\alpha$ -Dimethylsuccinanilic acid (AUWERS and SCHLOSSER), A., i, 640.
- $\alpha\alpha$ -Dimethylsuccinic acid from campholenic acid (BÉHAL), A., i, 179.
- from eucaryone (VON BAEYER), A., i, 246.
- electrical conductivity of (AUWERS and SCHLOSSER), A., i, 640.
- cis*- $\alpha\beta$ -Dimethylsuccinic acid from ethylic methylmalonate and ethylic α -bromopropionate (BONE and PERKIN), T., 262; P., 1896, 64.
- conversion of, into *trans*dimethylsuccinic acid (BONE and PERKIN), T., 264; P., 1896, 64.
- calcium salt (BONE and PERKIN), T., 261; P., 1896, 64.
- amylic salts, rotatory power of (WALDEN), A., ii, 633.
- cis*- $\alpha\beta$ -Dimethylsuccinic anhydride from *cis*- and *trans*-modifications (BONE and PERKIN), T., 264; P., 1896, 64.
- trans*- $\alpha\beta$ -Dimethylsuccinic acid from ethylic methylmalonate and α -bromopropionate (BONE and PERKIN), T., 262; P., 1896, 64.
- and its ferric, copper, lead, silver, calcium salts (BONE and PERKIN), T., 260; P., 1896, 64.
- amylic salt, rotatory power of (WALDEN), A., ii, 633.
- trans*- $\alpha\beta$ -Dimethylsuccinic anhydride (BONE and PERKIN), T., 266; P., 1896, 64.
- $\alpha\alpha$ -Dimethylsuccino- β -naphthil (AUWERS and SCHLOSSER), A., i, 640.
- $\alpha\alpha$ -Dimethylsuccino- β -naphthilic acid (AUWERS and SCHLOSSER), A., i, 640.
- Dimethylsuccino-*p*-tolil (AUWERS and SCHLOSSER), A., i, 640.
- Dimethylsuccino-*p*-tolilic acid (AUWERS and SCHLOSSER), A., i, 640.
- Dimethyltetrahydropyronedicarboxylic acid, ethylic salt (PETRENKO-KRITSCHENKO and STANISCHEWSKY), A., i, 471, 472.
- Dimethyl-*o*-toluidine, magnetic rotatory power, &c., of (PERKIN), T., 1108, 1138, 1156, 1211, 1233, 1245.
- hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1111, 1131, 1139, 1222, 1246.

- Dimethyl-*p*-toluidine, magnetic rotatory power, &c., of (PERKIN), T., 1108, 1138, 1156, 1211, 1233, 1245.
 hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1111, 1131, 1139, 1222, 1246.
 nitration of (ROMBURGH), A., i, 478.
m-nitro-, and its reduction products (PINNOW), A., i, 161.
*d*initro- (PINNOW), A., i, 161.
- Dimethyl-*p*-toluidinephenylthiocarbamide (PINNOW), A., i, 162.
- Dimethyl-3 : 4-tolylenediamine : its acetyl derivative and salts (PINNOW), A., i, 161.
- Dimethyltricarballic acids, stereoisomeric (ZELINSKY and TSCHERNOSWITOFF), A., i, 281.
 electric conductivities of (ZELINSKY), A., i, 349.
- Dimethyluramil, thio- (FISCHER), A., i, 143.
- Dimethyluric acid, action of ammonium sulphide on (FISCHER), A., i, 143.
- γ -Dimethyluric acid (FISCHER and ACH), A., i, 12.
- δ -Dimethyluric acid (FISCHER), A., i, 13.
- Dimethyluric acid (m. p. 370°) (FISCHER and ACH), A., i, 12.
- Dimethylvioluric acid and its sodium salt (FISCHER and ACH), A., i, 263.
 action of potash and of barium hydroxide on (ANDREASCH), A., i, 88, 89.
- 4 : 5-Dimethylxanthone, action of zinc and acetic acid on (GURGENJANZ and KOSTANECKI), A., i, 52.
- 2 : 7-Dimethylxanthone, action of zinc and acetic acid on (GURGENJANZ and KOSTANECKI), A., i, 52.
- Dimorphism of ice (BARENDRECHT), A., ii, 417.
- Dinaphthacridone (MÖHLAU), A., i, 243.
- α -Dinaphthalidocitric acid, oxidation of (GASSMANN), A., i, 488.
- Di- β -naphthylamine (GASSMANN), A., i, 488.
- β -Dinaphthylbenzylidenic oxide (MERCK), A., i, 52.
- Dinaphthylenbutenone. See Diacenaphthylidenone.
- β -Dinaphthylpropylenedisulphone, isomeric of (TROEGER and ARTMANN), A., i, 570.
- β -Dioxydimethylpurin (FISCHER), A., i, 13.
 chloro- (FISCHER), A., i, 13.
- Dicyclopentadiene and its nitrosochloride and nitrosate (KRAEMER and SPILKER), A., i, 290.
- Dipentene from geraniol and formic acid (BERTRAM and GILDEMEISTER), A., i, 382.
 from terpineol (WALLACH), A., i, 572.
 constitution of (TILDEN), T., 1014.
 hydrochloro-, nitrosochloride, behaviour of, towards hydrogen chloride (VON BAEYER), A., i, 246.
- Diphenacyl. See Diphenylethylene diketone.
- Diphenazone-*o*-hydroxycarboxylic acid, dibromo-, and its sodium salt
 $[N : Br_2 : O = 1 : 3 : 5 : 4 ;$
 $N : OH : COOH = 1 : 4 : 3]$
 (MÖHLAU and UHLMANN), A., i, 166.
- Diphenols. *o*-, *m*-, and *p*- (DE CONINCK), A., i, 473.
- Diphenoxyanilic acid and its sodium salt (JACKSON and GRINDLEY), A., i, 155.
- Diphenoxybutyric acid. See Diphenoxyethylacetic acid.
- Diphenoxydiethoxyquinone (JACKSON and GRINDLEY), A., i, 155.
- Diphenoxydiethylacetic acid (*diphenoxyhexoic acid*) and its salts (BENTLEY, HAWORTH, and PERKIN), T., 169; P., 1896, 36; (PERKIN), T., 1502.
- Diphenoxydimethoxyquinone (JACKSON and GRINDLEY), A., i, 156.
- Diphenoxydiethylmalonic acid and its salts (BENTLEY, HAWORTH, and PERKIN), T., 169; P., 1896, 36; (PERKIN), T., 1501.
 action of heat on (BENTLEY, HAWORTH, and PERKIN), T., 169; P., 1896, 36.
- Diphenoxyethylacetic acid (*diphenoxybutyric acid*), action of hydrogen chloride in acetic acid on (BENTLEY, HAWORTH, and PERKIN), T., 170; P., 1896, 36.
- Diphenoxyhexoic acid. See Diphenoxydiethylacetic acid.
- Diphenoxyquinol, *dichloro*- (JACKSON and GRINDLEY), A., i, 19.
- Diphenoxyquinone, *dibromo*- (JACKSON and GRINDLEY), A., i, 156.
chloro- (JACKSON and GRINDLEY), A., i, 156.
dichloro- (JACKSON and GRINDLEY), A., i, 19.
- Diphenyl, magnetic rotatory power, &c., of (PERKIN), T., 1085, 1087, 1089, 1153, 1196, 1230, 1242.
o-amino-, formyl, acetyl, propionyl, and benzoyl derivatives of (PICTET and HUBERT), A., i, 52, 53, 483.
p-amino-, composition of (HOFMANN LECTURE), T., 689.

- diphenyl, chloro-, from *p*-chlorodiazobenzene anhydride (BAMBERGER), A., i, 299.
- dichlorodinitrosulphoxide (UNGER and HOFMANN), A., i, 536.
- p*-nitro-, from di-*p*-nitrodiazobenzene sulphide and benzene (BAMBERGER and KRAUS), A., i, 219.
- 2 : 4'-dinitro- (KÜHLING), A., i, 236.
- 4 : 4'-dinitro- (KÜHLING), A., i, 236.
- diphenyl ethylene diketone (*diphenacyl*) (FRITZ), A., i, 619.
- bromo- (FRITZ), A., i, 152.
- the two isomerides of (KLINGER and LONNES), A., i, 687.
- diphenylacetamidine, discovery of (HOFMANN LECTURE), T., 704.
- diphenylacetophenone and its bromoderivative (DELACRE), A., i, 486.
- diphenylacetylene (*tolane*), action of water on (DESGREZ), A., i, 2.
- dibromide, action of sodium benzenesulphinate on (OTTO), A., i, 242.
- diphenylacetylgllyceric acid (active), rotatory power of the methylic salt of (FRANKLAND and MACGREGOR), T., 111; P., 1896, 10.
- diphenylacetylmalonic acid, ethylic salt (SCHOTT), A., i, 700.
- diphenylallophanic acid, ethylic salt (HOFMANN LECTURE), T., 715.
- diphenylamine, discovery of (HOFMANN LECTURE), T., 615.
- absorption of picric acid from aqueous solution by (WALKER and APPLE-YARD), T., 1342; P., 1896, 148.
- diphenylamine, *o*-amino-. See Phenyl-*o*-phenylenediamine.
- 2 : 4-diamino-, and its diacetyl derivative (NIETZKI and ALMENRÄDER), A., i, 164.
- chlorothio- (UNGER and HOFMANN), A., i, 535, 536.
- dichlorothio- (UNGER and HOFMANN), A., i, 535, 536.
- tetrachlorothio- (UNGER and HOFMANN), A., i, 535.
- oxidation product of (UNGER and HOFMANN), A., i, 535.
- 2-nitramino-, and its monacetyl derivative (NIETZKI and ALMENRÄDER), A., i, 164.
- 2-nitramino-, acetyl derivative of (NIETZKI and BAUR), A., i, 165.
- nitroso- (RADENHAUSEN), A., i, 138.
- nitro-, and its hydrochloride (UNGER and HOFMANN), A., i, 535, 536.
- diphenylamine dyes, action of sunlight on (ÖGLOBIN), A., i, 649.
- diphenylbenzamidine, discovery of (HOFMANN LECTURE), T., 705.
- m*-Diphenylbenzene, synthesis of, and its identity with *isodiphenylbenzene* (CHATTAWAY and EVANS), T., 982; P., 1896, 114.
- Diphenylbenzenyldiamine. See Diphenylbenzamidine.
- $\beta\gamma$ -Diphenylbutyric acid, identity of, with pyroamaric acid (JAPP and LANDER), P., 1896, 110.
- s*-Diphenylcarbamide (*carbanilide*), preparation of (HOFMANN LECTURE), T., 649, 652; (HALLER), A., i, 32; (CAZENEUVE), A., i, 528; (CAZENEUVE and MOREAU), A., i, 544; (HANTZSCH and SCHULTZE), A., i, 673.
- o*-cyano- (PINNOW and SÄMANN), A., i, 366.
- di-m*-nitro- (CURTIUS), A., i, 34; (STRUVE and RADENHAUSEN), A., i, 35.
- di-p*-nitro- (STRUVE and RADENHAUSEN), A., i, 35.
- tetranitro*- (STRUVE and RADENHAUSEN), A., i, 35.
- Diphenylcarbazedicarboxylic acid, ethylic salt of (RUPE), A., i, 429.
- Diphenylcarbinol. See Benzhydrol.
- Diphenylcarboxylic acid (*phenylbenzoic acid*), *p*-amino-, and its hydrochloride (KÜHLING), A., i, 236.
- p*-nitro- (? 4' : 4) (KÜHLING), A., i, 236.
- Diphenyldibutylolactone (FITTIG, WOLFF, and LESSER), A., i, 171.
- Diphenyldiethylenediamine, discovery of (HOFMANN LECTURE), T., 684.
- 2 : 4-Diphenyldihydroglyoxaline (FEIST and ARNSTEIN), A., i, 258.
- 3 : 6-Diphenyl-2 : 4-dimethyldihydropyrazine and salts (KOLB), A., i, 577.
- 4 : 5-Diphenyl-1 : 2-dimethylcyclohexane (HARRIES and ESCHENBACH), A., i, 689.
- 3 : 6-Diphenyl-2 : 4-dimethylpyrazine and salts (KOLB), A., i, 577.
- Diphenyldimethyltetrahydro- γ -pyrone (VORLÄNDER and HOBBOHM), A., i, 546.
- dibromo- (VORLÄNDER and HOBBOHM), A., i, 546.
- Diphenyldiphenylenedicarbamide (SNAPE), A., i, 241.
- s*-Diphenyldiphenylene-ethane (KAUFMANN), A., i, 242; (KLINGER and LONNES), A., i, 375.
- ass*-Diphenyldiphenylene-ethane (KLINGER and LONNES), A., i, 691.
- Diphenyldiphenylene-ethylene (KAUFMANN), A., i, 242; (KLINGER and LONNES), A., i, 692.

- Diphenyldiphenylenepinacolin (KLINGER and LONNES), A., i, 691.
- Diphenyldiphenylenepropionic acid (KLINGER and LONNES), A., i, 375.
- Diphenyldiphenylenesuccinic anhydride (KLINGER and LONNES), A., i, 375.
- Diphenyldisulphonedimethyl-*p*-phenylenediamine (HINSBERG and HIMMELSCHN), A., i, 686.
- 2 : 5-Diphenyldisulphone-*p*-phenylenediamine and its acetyl derivative (HINSBERG and HIMMELSCHN), A., i, 686.
- 1 : 5-Diphenylisodithiobiazolone (BUSCH), A., i, 190.
- Diphenylene dicyanate, action of ammonia and aniline on (SNAPE), A., i, 241.
- Di-*o*-phenylene ketone. See Fluorenone.
- ψ-Diphenylene ketone and its oxime (KERP), A., i, 239.
- dinitro- (KERP), A., i, 239.
- Diphenylene oxide, formation of (GRAEBE and ULLMANN), A., i, 619.
- diselenide and its nitric acid derivative (KRAFFT and KASCHAU), A., i, 297.
- diselenoxide (KRAFFT and KASCHAU), A., i, 297.
- bisulphide, preparation of (KRAFFT and LYONS), A., i, 297.
- disulphoxide (KRAFFT and LYONS), A., i, 297.
- Diphenyleneazone and its diacetyl derivative (TAÜBER), A., i, 686.
- Diphenylenebisdihydroquinazoline and its hydrochloride and platinochloride (TROEGER and EGGERT), A., i, 563.
- Diphenylenedicarbamide (SNAPE), A., i, 241.
- Diphenylene-*o*-dihydrazine and its salts (TAÜBER), A., i, 686.
- Diphenylenedisulphone (KRAFFT and LYONS), A., i, 297.
- Diphenyleneglycollic acid, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Diphenylenemethylamine (KERP), A., i, 239.
- Diphenylenesulphone sulphide (KRAFFT and LYONS), A., i, 297.
- Diphenylethylenediamine. See Diphenylethylenamidine.
- Diphenylethylene. See Stilbene.
- Diphenylethylenediamine, discovery of (HOFMANN LECTURE), T., 685.
- bitartrates of (FEIST and ARNSTEIN), A., i, 258.
- Diphenylethylenedicarbamide (FEIST and ARNSTEIN), A., i, 259.
- Diphenylethylenedithiocarbamide (FEIST and ARNSTEIN), A., i, 259.
- Diphenylethylenethiocarbamide (FEIST and ARNSTEIN), A., i, 259.
- Diphenylformamidine (*diphenylmethenylamidine*) (CLAISEN), A., i, 92; (WALTHER), A., i, 166.
- discovery of (HOFMANN LECTURE), T., 684, 705.
- di-*m*-bromo- (WALTHER), A., i, 166.
- hexabromo- (WALTHER), A., i, 166.
- 2 : 4-dichloro- (WHEELER and BOLTWOOD), A., i, 478.
- di-*o*-nitro- (WALTHER), A., i, 166.
- di-*m*-nitro- (WALTHER), A., i, 166.
- di-*p*-nitro- (WALTHER), A., i, 166.
- Diphenylfumaric acid, production of from anhydrazetonebenzilcarboxylic acid (JAPP and LANDER), P., 1896, 109.
- production of, from diphenylcyclopentenonylacetic acid (JAPP and MURRAY), P., 1896, 147.
- Diphenylglycollic acid. See Benzilic acid.
- Diphenylguanidine (*melaniline*), preparation of: its salts and halogen derivatives (HOFMANN LECTURE), T., 650.
- action of cyanogen on (HOFMANN LECTURE), T., 651.
- dicyano- (HOFMANN LECTURE), T., 653.
- dinitro- (HOFMANN LECTURE), T., 651, 695.
- as-Diphenylhydrazine amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- Diphenylhydroxyacetophenone and its acetate (DELACRE), A., i, 486.
- Diphenylhydroxycyclopentanonecarboxylic acid (JAPP and LANDER), P., 1896, 109.
- Diphenylic ethylenic ether (BENTLEY HAWORTH, and PERKIN), T., 165.
- hexamethyleneglycol ether, preparation of (SOLONINA), A., i, 476.
- methylenic ether (BENTLEY, HAWORTH, and PERKIN), T., 166, 167.
- diselenide (KRAFFT and KASCHAU), A., i, 296.
- βm-Diphenylimidazole and its salts (MINOVIĆ), A., i, 704.
- Diphenylindone (HEYL and MEYER), A., i, 146.
- Diphenyliodinium iodide, preparation of (WILLGERODT), A., i, 676.
- periodide (WILLGERODT), A., i, 676.
- γ-Diphenylitaconic acid and its monethyl salt (STOBBE), A., i, 234.
- 4 : 5-Diphenyl-2-ketodihydro-1 : 3-azoxole (SÖDERBAUM), A., i, 483.

- Diphenylmaleic acid, production of, from anhydracetonbenzilcarboxylic acid (JAPP and LANDER), P., 1896, 109.
production of, from diphenylcyclopentenonylacetic acid (JAPP and MURRAY), P., 1896, 147.
- Diphenylmethane, refraction equivalent of (ANDERLINI), A., ii, 229.
magnetic rotatory power, &c., of (PERKIN), T., 1064, 1085, 1086, 1152, 1195, 1230, 1242.
α-chloro-*o*-cyano- (GABRIEL and STELZNER), A., i, 507.
- Diphenylmethenylamidine. See Diphenylformamidine.
- Diphenylmethenyldiamine. See Diphenylformamidine.
- 4 : 5-Diphenyl-2-methyl-4 : 5-dihydroglyoxaline (FEIST and ARNSTEIN), A., i, 259.
- Diphenylnitromethane, labile form of (KONOWALOFF), A., i, 675.
- 4 : 5-Diphenyloctane-2 : 7-dione and its diphenylhydrazone and dioxime (HARRIES and ESCHENBACH), A., i, 305, 306.
hexabromo- (HARRIES and ESCHENBACH), A., i, 689.
- 2 : 5-Diphenyloxazole and its hydrochloride and methiodide (FISCHER), A., i, 262.
nitro- (MINOVICI), A., i, 705.
- 4 : 5-Diphenylisooxazole (GOLD-SCHMIDT), A., i, 189.
- Diphenyloxetone (FITTIG, WOLFF, and LESSER), A., i, 171.
- Diphenyloxetonecarboxylic acid and salts (FITTIG, WOLFF, and LESSER), A., i, 171.
- Diphenylparaconic acid, *β*-bromo- (STOBBE), A., i, 234.
- Diphenylcyclopentane (JAPP and LANDER), P., 1896, 108.
- Diphenylcyclopentenone (JAPP and LANDER), P., 1896, 108.
- Diphenylcyclopentenonylacetic acid (JAPP and MURRAY), P., 1896, 147.
- 3-Diphenylphenanthrapyrazine (FEIST and ARNSTEIN), A., i, 259.
- Diphenylphenofluorindine (KEHRMANN and BÜRGIN), A., i, 513.
- Diphenylphenohomazine. See Anhydrodi-*o*-aminobenzophenone.
- 6-Diphenylpiperidine and its hydrochloride (PAAL), A., i, 389.
- 6-Diphenylpyrazine-2 : 4-dicarboxylic acid and its ethylic salt (KOLB), A., i, 578.
- 6-Diphenylpyridine (PAAL), A., i, 389.
- 2-Diphenyl-6-pyridone (LEBEN), A., i, 575.
- Diphenylselenone (KRAFFT and LYONS), A., i, 304.
- Diphenylsemicarbazide, nitroso- (BUSCH and BECKER), A., i, 581.
- Diphenylsuccinic acid, *α*- and *β*-ethylic salts of (HELL and WEINZWEIG), A., i, 45.
- Diphenylsulphone-*o*-aminophenol and its salts (HINSBERG and HIMMELSCHEIN), A., i, 686.
- Diphenylsulphonediethylethylenediamine (HINSBERG and STRUPLER), A., i, 47.
- Diphenylsulphonedimethylethylenediamine (SCHNEIDER), A., i, 200.
- Diphenylsulphone-ethylenediamine (HINSBERG and STRUPLER), A., i, 47; (SCHNEIDER), A., i, 200.
- Diphenylsulphone-ethylene-*o*-phenylenediamine (HINSBERG and STRUPLER), A., i, 47.
- Diphenylsulphonemethylene-*o*-phenylenediamine (HINSBERG and STRUPLER), A., i, 47.
- Diphenylsulphone-*o*-phenylenediamine (HINSBERG and STRUPLER), A., i, 47.
- Diphenylsulphone-*m*-phenylenediamine (HINSBERG and STRUPLER), A., i, 48.
- Diphenylsulphonetrimethylenephenylenediamine (HINSBERG and STRUPLER), A., i, 48.
- Diphenyltetrahydropyrone-dicarboxylic acid, ethylic salt (PETRENKO-KRITSCHENKO and STANISCHEWSKY), A., i, 472.
- Diphenyltetramethyleneglycol (FRITZ), A., i, 152.
- Diphenyltetrazole (WEDEKIND), A., i, 631.
- 1 : 3-Diphenylisotetrazolone and its hydrochloride, picrate, and platinochloride (BUSCH and BECKER), A., i, 581.
- 1 : 5-Diphenylthiobiazoline, 3-hydro-sulphide, and its sodium and potassium salts (BUSCH), A., i, 190.
3-methosulphide (BUSCH), A., i, 190.
bisulphide (BUSCH), A., i, 190.
- s*-Diphenylthiocarbamide, action of iodine on (HOFMANN LECTURE), T., 715.
o-cyano- (PINNOW and SÄMANN), A., i, 366.
o-dicyano- (PINNOW and SÄMANN), A., i, 366.
- 4 : 5-Diphenyl-2-thiodihydro-1 : 3-azoxole (SÖDERBAUM), A., i, 484.
- Diphenylthiohydantoinacetic acid (ANDREASCH), A., i, 90.
- Diphenylthiophthaluric acid (DUNLAP), A., i, 471.

- Diphenylthiosemicarbazide (WALTHER), A., i, 543; (BUSCH and BECKER), A., i, 581.
- Diphenyl-*o*-tolylguanidine: its nitrate and platinochloride (MARCKWALD), A., i, 31.
- Diphenyl-*p*-tolylguanidine: its hydrochloride and platinochloride (MARCKWALD), A., i, 30.
- o*-Diphenylurethane (PICTET and HUBERT), A., i, 53, 483.
- Diphthalidyl-2'-methylquinoline (NENCKI), A., i, 256.
- Diphthalidyl-1:3:2'-trimethylquinoline (NENCKI), A., i, 256.
- Dipiperonaltriacetophenone (KOSTANECKI and SCHNEIDER), A., i, 614.
- Dipropenyl. See Hexinene.
- Dipropionic acid (*lactylhydracrylic acid*), $\alpha\beta$ -thio- (LOVÉN), A., i, 412.
- $\alpha\beta'$ -Thiodipropionic acid (LOVÉN), A., i, 412, 413.
- Dipropionyl. See Diethyl diketone.
- Dipropionylidurene (BAUM and MEYER), A., i, 228.
- Dipropionylglyceric acid, active, rotatory power of the methylic salt of (FRANKLAND and MACGREGOR), T., 116; P., 1896, 10.
- 4:4-Dipropoxybenzophenone and its oxime (GATTERMANN), A., i, 172.
- 4:4-Dipropoxythiobenzophenone (GATTERMANN), A., i, 172.
- Dipropyl ketone (BORN), A., i, 199.
refraction equivalent of (ANDERLINI), A., ii, 229.
magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
heat of evaporation of (LUGININ), A., ii, 146.
- Diisopropyl ketone (BORN), A., i, 199; (FRANKE), A., i, 404.
- Dipropylamine, partial oxidation of (DE HAAS), A., i, 122.
- Dipropylaminechloroborine (MICHAELIS and LUXEMBOURG), A., i, 344.
- Dipropylamineoxychlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Dipropylaminethiochlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
- Dipropylaminoacetone and its hydrochloride (STOERMER and POGGE), A., i, 408.
methiodide (STOERMER and POGGE), A., i, 408.
oxime, phenylhydrazone, and semicarbazide of (STOERMER and POGGE), A., i, 408.
- Dipropylecyanacetamide (ERRERA), A., i, 529.
- Dipropylene- ψ -hydrazodicarbothiamide: its hydrochloride and acetyl and nitroso-derivatives (FREUND and HEILBRUN), A., i, 416.
- Diisopropylglycollic acid. See Hydroxy-octic acids.
- α -Dipropylhydantoin (ERRERA), A., i, 529.
- Dipropylpropional, chloro- (BROCHET), A., i, 114.
- Dipropylmethane. See Heptane.
- Diisopropylmethane. See Heptane.
- Diisopropylloxalic acid (REFORMATSKY), A., i, 129.
- Dipropylisopropyl alcohol. See Ennylic alcohols.
- Diisopropylsuccinanil (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccinanilic acid (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccinic acid, and its electrical conductivity (AUWERS and SCHLOSSER), A., i, 639.
action of bromine on (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccinic anhydride (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccinimide (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccino- β -naphthil (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccino- β -naphthilic acid (AUWERS and SCHLOSSER), A., i, 640.
- Diisopropylsuccino-*p*-tolilic acid (AUWERS and SCHLOSSER), A., i, 640.
- Dipyre, limitation of term (SALOMON), A., ii, 434.
from Lombardy (SALOMON), A., ii, 433.
- Dipyridine dimethyl octoiodide and enneaiodide (PRESCOTT and TROWBRIDGE), A., i, 186.
trimethylene dibromide (FLINTERMANN and PRESCOTT), A., i, 317.
- d*-Disantonous acid and its methylic and ethylic salts (ANDREOCCI), A., i, 183, 184.
- l*-Disantonous acid (ANDREOCCI), A., i, 184.
- i*-Disantonous acid (ANDREOCCI), A., i, 184.
- Disazo-compound, $C_{14}H_{12}N_4$, obtained from the product of the action of chloroform and potash on *m*-aminobenzoic acid (ELLIOTT), T., 1516; P., 1896, 171.
- Discs of cactus, alkaloids in the (HEFFTER), A., i, 268.
- Disease, excretion of ammonia in (RUMPF), A., ii, 618.

- Disinfectants, estimation of phenol in (FRESENIUS and MAKIN), A., ii, 580.
- Dissociation, electrolytic. See Electrolytic dissociation.
- Dissociation of the acetates of weak bases dissolved in benzene (ZOPPELLARI), A., ii, 515.
- of carbon dioxide, effect in limiting the combustion of carbonic oxide of the (DIXON), T., 786; P., 1896, 56.
- of mixed polyhalogen salts in solution (JAKOWKIN), A., ii, 514.
- of potassium tribromide in solution (JAKOWKIN), A., ii, 514.
- of potassium triiodide in solution (JAKOWKIN), A., ii, 514.
- Dissociation-pressure of palladium hydride (KRAKAU), A., ii, 5.
- of hydrated salts. See Heat.
- Disthene. See Kyanite.
- Distillation in a vacuum, apparatus for (FREER), A., ii, 557.
- in high vacua (KRAFFT and WEILANDT), A., ii, 464.
- aa*-Dithienyl, *tetrachloro*- (EBERHARD), A., i, 16.
- hexachloro*- (EBERHARD), A., i, 16.
- tetrachlorodibromo*- (EBERHARD), A., i, 16.
- Dithienylphenylmethane (TÖHL and NÄHKE), A., i, 690.
- Dithienyl-*o*-nitrophenylmethane (TÖHL and NÄHKE), A., i, 690.
- Dithienyl-*m*-nitrophenylmethane (TÖHL and NÄHKE), A., i, 690.
- Dithienyl-*p*-nitrophenylmethane (TÖHL and NÄHKE), A., i, 690.
- Dithioacetylacetone. See Acetylacetone.
- Di-*o*-toluidodihydroxybenzoyl-*nn*-dihydropyrazine. See Dihydrohippuroflavindi-*o*-toluidide.
- o*-Ditoluoyltartaric acid, rotatory power of the methylic and ethylic salts of (FRANKLAND and WHARTON), T., 1312, 1589; P., 1896, 148.
- n*-Ditoluoyltartaric acid, rotatory power of the methylic and ethylic salts of (FRANKLAND and WHARTON), T., 1317; P., 1896, 148.
- o*-Ditoluoyltartaric acid, rotatory power of the methylic and ethylic salts of (FRANKLAND and WHARTON), T., 1314; P., 1896, 148.
- Di-*p*-tolyl benzylidenedimethyl diketone (KOSTANECKI and ROSSBACH), A., i, 688.
- furfurylidenedimethyl diketone (KOSTANECKI and PODRAJANSKY), A., i, 689.
- p*-Ditolylacetamidine (MARCKWALD), A., i, 29.
- Di-*o*-tolylcarbamide (CAZENEUVE and MOREAU), A., i, 544.
- Di-*p*-tolylcarbamide (CAZENEUVE and MOREAU), A., i, 544.
- Ditolylene bisulphide (KRAFFT and LYONS), A., i, 297.
- Di-*o*-tolylformamidine (*ditolylmethenylamidine*) (WALTHER), A., i, 166.
- Di-*p*-tolylformamidine and its acetate (WALTHER), A., i, 166.
- op*-Ditolyl sulphide (BOURGEOIS), A., i, 18.
- mp*-Ditolyl sulphide (BOURGEOIS), A., i, 18.
- Diisovaleryl. See Diisobutyl diketone.
- Divaleryltartaric acid, rotatory power of the diamylic salts of (GUYE and GOUDET), A., ii, 458.
- Dixanthylene (GURGENJANZ and KOSTANECKI), A., i, 52.
- Dolomite from Servia (STANOJEVIĆ), A., ii, 254.
- Dolomitic rock from Graz (IPPEN), A., ii, 483.
- rocks, origin of (KLEMENT), A., ii, 116; (KONINCK), A., ii, 481.
- and limestones from Canada (HARRINGTON), A., ii, 116.
- Dolphin, substances present in the liver of the (DRECHSEL), A., ii, 378.
- Drimin (HESSE), A., ii, 62.
- Drimol and its derivatives (HESSE), A., ii, 63.
- Drimys granatensis*, examination of the bark and leaves of (HESSE), A., ii, 62.
- Drimyssic acid (HESSE), A., ii, 63.
- Drying ovens, heating apparatus for (THIELE), A., ii, 91.
- Dulcitol, boiling point under reduced pressure of (KRAFFT and DYES), A., ii, 89.
- iso*-Dulcitol, rotatory power of α -, β -, and γ -modifications (TANRET), A., i, 334.
- Dumortierite, or andalusite, from Argentina (JANNASCH), A., ii, 568.
- Durene, *diamino*- (RÜGHEIMER and HANKEL), A., i, 677.
- Durene-carboxylic acid (MEYER), A., i, 433.
- iso*-Durene-carboxylic acid (MEYER), A., i, 433.
- Duroquinol, preparation of (RÜGHEIMER and HANKEL), A., i, 677.
- dipropionate. See Propionic acid, duroquinol salt of.
- diacetate. See Acetic acid, duroquinol salt of.
- Duroquinone, preparation of (RÜGHEIMER and HANKEL), A., i, 677.
- action of alcoholic potash on (RÜGHEIMER and HANKEL), A., i, 687.

- Dye, yellow, of *Afzelia cuanzensis* (KRISTELLI), A., ii, 208.
- Dyeing, chemical theory of (WALKER and APLEYARD), T., 1341; P., 1896, 148.
- Dyes, acid compounds of yellow (PERKIN), T., 1440; P., 1896, 167.
- constitution of natural yellow (PERKIN), T., 1439; P., 1896, 167.
- tests for red vegetable (WEIGERT), A., i, 388.
- Dynamite, estimation of glycerol for (LEWKOWITSCH), A., ii, 452.
- Dyscrasite from Broken Hill, N.S.W. (SMITH), A., ii, 30.

E.

- Earths, rare, in monazite sands (SCHÜTZENBERGER and BOUDOUARD), A., ii, 475.
- α -Ecgonine (WILLSTÄTTER), A., i, 582.
- preparation from tropinone cyanhydrin by hydrolysis; and its salts (WILLSTÄTTER), A., i, 707.
- benzoyl derivative of (WILLSTÄTTER), A., i, 708.
- methylic salt of, and its salts (WILLSTÄTTER), A., i, 708.
- Edestin (OSBORNE), A., i, 400.
- occurrence of, in barley (OSBORNE), A., i, 455.
- occurrence of, in cotton seeds (OSBORNE and VORHEES), A., ii, 210.
- occurrence of, in hemp, squash, and castor oil bean (OSBORNE and CAMPBELL), A., i, 716.
- relation of bynedestin to (OSBORNE and CAMPBELL), A., i, 714.
- Elaboration, distinction between assimilation and (CROSS, BEVAN, and SMITH), T., 1605; P., 1896, 174.
- Elaidic acid, behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.
- Electric arc for laboratory experiments at high temperatures (WALKER), A., ii, 462.
- Electrical method of determining transition points (BAUR), A., ii, 146.
- ELECTRICITY.
- Accumulator plates, non-sulphating (WARREN), A., ii, 554.
- Accumulators, testing the suitability of, for special purposes (SCHOOP), A., ii, 451.
- Conductivity, determination of electrolytic (MALTBY), A., ii, 144.
- of solutions, influence of pressure on (TAMMANN), A., ii, 6.

ELECTRICITY.

- Conductivity of solutions containing two electrolytes having a common ion (MCINTOSH), A., ii, 555.
- of dilute solutions, theory of the (BEKETOFF), A., ii, 348.
- of salts, dilution law of the (SAKURAI), T., 1661; P., 1896, 182.
- of salt solutions, connection between concentration and (VAN'T HOFF), A., ii, 145; (STORCH), A., ii, 288; (KOHLRAUSCH), A., ii, 295.
- of solutions in mixtures of alcohol and water (SCHALL), A., ii, 463.
- of solutions of various salts in acetone (LASZCZYNSKI), A., ii, 555.
- of solutions of salts and acids in formic acid (ZANNINOVICH-TESSARIN), A., ii, 352.
- of salts dissolved in glycerol (CATTANEO), A., ii, 231.
- of salts and acids dissolved in methylic alcohol (CARRARA), A., ii, 511.
- of solutions of amidosulphonic acid and of sodium amidosulphonate (SAKURAI), T., 1656; P., 1896, 181.
- of aqueous solutions of ammonia (KONOWALOFF), A., ii, 351.
- of caesium chlorate (BAUR), A., ii, 144.
- of ethereal solutions of hydrochloric acid (MALTBY), A., ii, 144.
- of potassium chlorate (BAUR), A., ii, 144.
- of aqueous solutions of potassium chloride (MALTBY), A., ii, 144.
- of potassium chloride solutions at 0° (WOOD), A., ii, 236.
- of rubidium chlorate (BAUR), A., ii, 144.
- of solutions of the salts of the polythionie acids (HERTLEIN), A., ii, 353.
- of aqueous solutions of yttrium sulphate (JONES), A., ii, 462.
- of solutions of optical isomerides (WALDEN), A., ii, 553.
- of aqueous solutions of acetylene (JONES and ALLEN), A., ii, 462.
- of amidotetrazotic acid and its sodium salt (BAUR), A., ii, 144.
- of sodium azotetrazole (BAUR), A., ii, 144.
- of benzenesulphinic acid (LOVÉN), A., ii, 413.

ELECTRICITY.

- Conductivity of benzenesulphoneasparagine (LOVÉN), A., ii, 413.
 of benzenesulphoneglycine (LOVÉN), A., ii, 413.
 of ψ -eumenesulphoneglycine (LOVÉN), A., ii, 413.
 of β -dibromomethanesulphonepropionic acid (LOVÉN), A., ii, 413.
 of β -dichloromethanesulphonepropionic acid (LOVÉN), A., ii, 413.
 of diphenyleneglycollic acid (LOVÉN), A., ii, 413.
 of formanilide (EWAN), T., 96; P., 1896, 8.
 of selenodiacetic acid (LOVÉN), A., ii, 413.
 of tetrazole (BAUR), A., ii, 144.
 of sodium thioformanilide (EWAN), T., 97; P., 1896, 8.
 of β -thiophenecarboxylic acid (LOVÉN), A., ii, 413.
 of *p*-toluenesulphonic acid (LOVÉN), A., ii, 413.
 of *o*-toluenesulphoneglycine (LOVÉN), A., ii, 413.
 of *p*-toluenesulphoneglycine (LOVÉN), A., ii, 413.
 of ethereal solutions of trichloroacetic acid (MALTBY), A., ii, 144.
 of 1 : 3 : 4-xylenesulphonealanine (LOVÉN), A., ii, 413.
 of 1 : 3 : 4-xylenesulphoneglycine (LOVÉN), A., ii, 413.
 Convection currents in the electrolysis of water with small E.M.F., cause of (RICHARZ and LONNES), A., ii, 586.
 Currents, measurement of small (HERROUN), A., ii, 7.
 Dielectric constant, dependence on temperature and pressure of the (RATZ), A., ii, 288.
 relationship of the valency of gases to their (LANG), A., ii, 144.
 of mixtures of organic liquids (LINEBARGER), A., ii, 509.
 Discharge phenomena in gases (LEHMANN), A., ii, 143.
 in rarefied metallic vapours (WIEDEMANN and SCHMIDT), A., ii, 348.
 Electrocapillary phenomena between mercury and dilute sulphuric acid (GOUY), A., ii, 143.
 Electrodes, absorption of acids and alkalis from solution by platinised (KELLNER), A., ii, 232.
 of lead, silver, thallium, and manganese peroxides (TOWER), A., ii, 142.

ELECTRICITY.

- Electromotive force and partition equilibrium (BUCHERER), A., ii, 586.
 of cells containing solutions in equilibrium of partition (LUTHER), A., ii, 461.
 of silver salts, temperature coefficient of (LOVÉN), A., ii, 635.
 produced by the action of light on silver sulphide (RIGOLLOT), A., ii, 3.
 Energy necessary for the electrolysis of cadmium sulphate (JAHN), A., ii, 230, 231.
 for the electrolysis of copper nitrate (JAHN), A., ii, 230, 231.
 for the electrolysis of copper sulphate (JAHN), A., ii, 230, 231.
 for the electrolysis of zinc sulphate (JAHN), A., ii, 230, 231.
 Galvanic cell: carbon | chromic acid, zinc | caustic soda (MORISOT), A., ii, 4.
 Clark's (SKINNER), A., ii, 3.
 calculation of the E.M.F. of (MEYER), A., ii, 143.
 containing a peroxide electrode (TOWER), A., ii, 142.
 tin | chromic chloride (SKINNER), A., ii, 3.
 Parasite electrodes (DELVALEZ), A., ii, 407.
 Peltier effect between metals and electrolytes (JAHN), A., ii, 230, 231.
 Polarisation, galvanic, thermodynamics of (LE BLANC), A., ii, 4.
 in the electrolysis of cadmium sulphate (JAHN), A., ii, 230, 231.
 in the electrolysis of copper nitrate (JAHN), A., ii, 230, 231.
 in the electrolysis of copper sulphate (JAHN), A., ii, 230, 231.
 in the electrolysis of lead nitrate (JAHN), A., ii, 230, 231.
 in the electrolysis of silver nitrate (JAHN), A., ii, 230, 231.
 in the electrolysis of zinc sulphate (JAHN), A., ii, 230, 231.
 of a galvanic cell, measurement of the (STREINTZ), A., ii, 460.
 Potential difference between liquids and gases (KENRICK), A., ii, 460.
 between metals and electrolytes (MEYER), A., ii, 143.
 between dilute solutions (TOWER), A., ii, 586.
 between different electrodes and solutions of polythionates (HERTLEIN), A., ii, 353.
 between nitric acid and platinum (IHLE), A., ii, 460.

ELECTRICITY:

- Pyroelectric properties of *cis*- π -camphanic acid (POPE), T., 973; P., 1896, 116.
- Resistance of electrolytes. See Conductivity.
- of a galvanic cell, measurement of the (STREINTZ), A., ii, 460.
- of bismuth at low temperatures (DEWAR and FLEMING), A., ii, 5.
- of palladium hydride (KRAKAU), A., ii, 5.
- Spark length in various gases (COLLIE and RAMSAY), A., ii, 634.
- Specific inductive capacity. See Dielectric constant.
- Thermoelectromotive force of metals and alloys (DEWAR and FLEMING), A., ii, 4.
- Thermo-elements of amalgams and electrolytes (HAGENBACH), A., ii, 513.
- Electro-dissolution, value of, in purifying metals (WARREN), A., ii, 249.
- Electrolysis of fused zinc chloride (LORENZ), A., ii, 586.
- Helmholtz's discoveries in (FITZGERALD), T., 900; P., 1896, 25.
- of solutions of salts in acetone (ŁASZCZYŃSKI), A., ii, 556.
- of hydrochloric acid (OETTEL), A., ii, 555.
- apparatus for the (HIGLEY and HOWARD), A., ii, 557; (PICKEL), A., ii, 557.
- of silver nitrate (ŠULC), A., ii, 521; (MULDER and HERINGA), A., ii, 561.
- of sodium sulphides (DURKEE), A., ii, 559.
- of sulphuric acid (ELBS and SCHÖNHERR), A., ii, 519.
- of water (SOKOLOFF), A., ii, 510.
- for quantitative analysis (HEIDENREICH), A., ii, 545.
- apparatus for (GRÖGER), A., ii, 272.
- Electrolytic apparatus (TOMMASI), A., ii, 511.
- Electrolytic-dissociation, theory of (FITZGERALD), T., 906; P., 1896, 25.
- influence of, on molecular refraction (LE BLANC and ROHLAND), A., ii, 345.
- measured by means of the electromotive force of galvanic cells (TOWER), A., ii, 142.
- determination of, by colorimetric observations (DONNAN), A., ii, 405.
- in alcoholic solution (JONES and ALLEN), A., ii, 467.
- of acids (KORTRIGHT), A., ii, 463.
- Electrolytic-dissociation of salts and acids dissolved in formic acid (ZANINOVICH-TESSARIN), A., ii, 352.
- of salts dissolved in methylic and ethylic alcohols (WOELFER), A., ii, 237.
- of cobalt chloride at different temperatures (SALVADORI), A., ii, 512.
- of copper chloride at different temperatures (SALVADORI), A., ii, 512.
- of manganese chloride at different temperatures (SALVADORI), A., ii, 512.
- of mercuric chloride in alcoholic solution (SALVADORI), A., ii, 512.
- of nickel chloride at different temperatures (SALVADORI), A., ii, 512.
- of potassium chloride solutions at 0° (WOOD), A., ii, 236.
- of water when pure and mixed with alcohol (LÖWENHERZ), A., ii, 587.
- Electrolytic formation of hypochlorites and chlorates (OETTEL), A., ii, 517.
- Electrolytic preparation of beryllium (BORCHERS), A., ii, 520.
- of lithium (BORCHERS), A., ii, 520.
- Element, new, of the samarium group (DEMARÇAY), A., ii, 475.
- Elements, boiling point and genesis of the (BLANSHARD), A., ii, 233.
- specific volume and genesis of the (BLANSHARD), A., ii, 152.
- eutropic series of (ORTLOFF), A., ii, 355.
- supposed group of inactive (THOMSEN), A., ii, 16.
- Eliasite, spectrum of gas from (LOCKYER), A., ii, 597.
- Ellagic acid, occurrence of, in *Quercus bracho colorado* (PERKIN and GUNNELL), T., 1307; P., 1896, 158.
- Emerald? artificial? (REBUFFAT), A., ii, 313.
- Emerald. See Beryl.
- Emery from Naxos (TSCHERMAK), A., ii, 253.
- Emetine and its salts, preparation of (PAUL and COWNLEY), A., i, 192.
- action of heat on (PAUL and COWNLEY), A., i, 395.
- estimation of, in ipecacuanha (CRIPPS), A., ii, 284.
- Emodin, detection of (FORMÁNEK), A., ii, 401.
- Emulsin, solubility of, in alcohol (DASTRE), A., i, 398.
- action of, on salicin (TAMMANN), A., ii, 244.
- from fungi, hydrolysing property of (BOURQUELOT and HÉRISSEY), A., i, 195.

- Enamel for iron, composition of (EMMERLING), A., ii, 523.
- Enamel of teeth, composition of (TOMES), A., ii, 315.
- Eninvertase (BAU), A., i, 453.
- ENNINYLIC ALCOHOL:
- Diallylisopropyl alcohol and the action of hydrogen bromide on it (OBERREIT), A., i, 666.
- Ennoic acid (*nonoic acid*, *pelargonic acid*) (SPIECKERMANN), A., i, 410.
- ENNYLIC ALCOHOL (*nonylic alcohol*):
- Dipropylisopropyl alcohol, dibromo-, and action of alcohol and zinc dust on (OBERREIT), A., i, 666.
- Ennylamine (*nonylamine*) (BEHREND), A., i, 410.
- Enzyme from yeast, a new (BAU), A., i, 453.
- Enzymes, velocity of changes produced by (TAMMANN), A., ii, 243.
- hydrolysis by certain (FISCHER and LINDNER), A., i, 195.
- digestion of cellulose by (GRÜSS), A., ii, 669.
- influence of, in the formation of indigo (VAN LOOKEREN and VAN DER VEEN), A., ii, 207.
- Eosin. See Fluorescein, tetrabromo-.
- Epidote, composition and optical properties of (FORBES), A., ii, 371.
- from Colorado (EAKINS), A., ii, 39.
- from the Harz (LÜDECKE), A., ii, 312.
- from Huntington, Mass. (FORBES), A., ii, 371.
- from the Tyrol (WEINSCHENK), A., ii, 569.
- Epidote and zoisite group (WEINSCHENK), A., ii, 568.
- Epiguanine (KRÜGER), A., i, 62.
- Equilibrium between alkylammonium cyanates and the corresponding carbamides (WALKER and APPLE-YARD), T., 193; P., 1896, 12.
- between diphenylamine, picric acid, and water (WALKER and APPLE-YARD), T., 1342; P., 1896, 148.
- between picric acid dissolved in water and absorbed by silk (WALKER and APPLE-YARD), T., 1339; P., 1896, 147.
- chemical, between hexachlor- α -keto- β - and γ -pentene (KÜSTER), A., ii, 158.
- of solutions in liquid and solid substances (VAN BEMMELEN), A., ii, 155.
- in ammoniacal solutions of magnesium salts (LOVÉN), A., ii, 413.
- in the system $\text{HgO}-\text{SO}_3-\text{H}_2\text{O}$ (HOITSEMA), A., ii, 15.
- Equilibrium in the systems formed from the salt NaNO_2 and NH_4Cl (MEYER-HOFFER), A., ii, 414.
- Equilibrium of partition and electromotive force (BUCHERER), A., ii, 586.
- electrical behaviour of solutions in (LUTHER), A., ii, 461.
- of bromine between salt solutions and carbon tetrachloride, &c. (JAKOWKIN), A., ii, 514.
- of iodine between two solvents (JAKOWKIN), A., ii, 295.
- of iodine between salt solutions and carbon tetrachloride, &c. (JAKOWKIN), A., ii, 514.
- Erbium oxide, colloidal solution of (DELAFONTAINE), A., ii, 562.
- Erythritol-diacetone (SPEIER), A., i, 77.
- Erythro-dextrin. See under Dextrin.
- Eserine (*physostigmerin*), detection of (FORMÁNEK), A., ii, 401.
- Essential oils. See Oils.
- Essonite from Canaan, Conn. (HOBBS), A., ii, 34.
- Ethane and nitrous oxide, critical phenomena of mixtures of (KUENEN), A., ii, 10.
- nitro-, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.
- sodium salt, action of benzoic chloride on (NEF and JONES), A., i, 460.
- action of ethylic chloroformate on (NEF and JONES), A., i, 460.
- Ethantetracarboxylic acid, ethylic salt (PERKIN and THORPE), T., 1485; (BISCHOFF), A., i, 130, 468, 528, 601.
- ethylic salts, action of ethylic chloromalonate and bromomalonate on (BISCHOFF), A., i, 601.
- methylic salt (BISCHOFF), A., i, 468, 527.
- action of bromine on and action of sodium methoxide and iodine on (BISCHOFF), A., i, 468.
- Ethantetricarboxylic acid, ethylic salt, velocity of hydrolysis (HJELT), A., i, 600.
- sodio-, ethylic salt, action of ethylic chloromalonate and bromomalonate on (BISCHOFF), A., i, 601.
- action of methylic bromomalonate on (BISCHOFF), A., i, 600.

Ethenylamidoxime, cyano-, and its acetyl and benzoyl derivatives (SCHMIDTMANN), A., i, 458.

Ethenyl-*o*-aminothiophenol amyl-iodide, colouring matter obtained from (HOFMANN LECTURE), T., 714.

Ethenyl derivative obtained from acetyl derivative of 2 : 4'-diaminodiphenylamine (NIETZKI and BAUR), A., i, 165.

Ethereal salts in the oil from capsicum seeds (VON BITTÓ), A., ii, 209.

effect of mineral acids in the preparation of (FISCHER and SPEIER), A., i, 201, 202.

Etherification (MEYER), A., i, 170, 228, 547; (SHUKOFF), A., i, 229; (GOLDSCHMIDT), A., i, 229; (WEGSCHEIDER), A., i, 94, 229.

indirect (TAFEL), A., ii, 470.

in presence of hydrochloric acid (PETERSEN), A., ii, 638.

efficiency of hydrogen chloride in promoting, the probable explanation of (COLSON), A., i, 282.

facility of (BRÜHL), A., i, 178.

Ethers. See:—

Amylic phenylic ether.

Anethoil.

Anisoil.

Apiole and *iso*-Apiole.

Apione.

Azophenylic ether.

Benzhydrol ether.

Benzimidoethyl ether.

Benzimidomethyl ether.

Benzoylmethylresorcinol methyl ether.

Benzyl methyl oxide.

Benzylaminophenetoil.

Benzylideneanhydroglycogallol diethyl ether.

Benzylidene diethyl ether.

β -Benzylloxypropylene.

Bisethylbenzoylcarbinol.

Carvacrylic amylic ether.

Cholesteryl ether.

ψ -Cumenol bromide, dibromo-, ethyl ether of its ammonia compound.

Diamyloxyquinol.

Diamyloxyquinone.

Diamyloxyquinonediamylhemiacetal.

Dibenzylloxyquinone.

Diduroquinone, methylic, ethylic, and propylic ethers.

Diethoxyacetophenone.

2 : 4-Diethoxybenzylideneacetophenone.

Diethoxybenzylidenetriacetophenone.

Diethoxyphenylmalonamide.

Diethoxyphenyloxamide.

Ethers. See:—

Diethoxyquinol.

Diethoxyquinone.

Diethoxy-1 : 3 : 4-xylenol.

Dihydroxytetramethylstilbene, ethyl ether.

p-Dimethoxybenzene (dimethylquinol).

2 : 4-Dimethoxybenzaldehyde.

Dimethoxyphenylmalonamide.

Dimethoxyphenyloxamide.

Dimethoxyquinol.

Dimethoxyquinone.

Dimethoxy-1 : 3 : 4-xylenol.

Dimethylapionol.

Dimethylapionolearboxylic acid.

Dimethylhomopyrocatechol.

Dimethylquinol (*p*-dimethoxybenzene).

Dimethylresorcinol.

Diphenoxyquinone.

Diphenylic ethylenic ether.

Diphenylic hexamethyleneglycol ether.

Diphenylic metylenic ether.

Ethoxyanethoil.

Ethoxybenzylideneacetone.

Ethoxybenzylideneacetophenone (phenyl ethoxystyryl ketone).

Ethoxybromanethoil.

Ethoxynaphthalenes. See α - and β -Naphthylic ethylic oxides.

s- γ -Ethoxybutylphenylthiocarbamide.

Ethoxy- ψ -cumenol.

μ -Ethoxypentiazoline.

2-Ethoxy-5-phenyl-3 : 4-dithiobiazolone.

β -Ethoxypropylene.

1' : 3'-Ethoxypropylisoquinoline.

Ethoxyquinolines.

Ethoxystyrene.

ω -Ethoxy-1 : 3 : 4-xylenol.

Ethylisoeugenol.

Ethylic ether.

Gentisin.

Guaiaacol.

Hydrazophenylic ether.

Hydroxy- ψ -cumenol ether.

Hydroxydimethoxycoumarincarboxylic acid.

Hydroxyethoxymethylquinoline.

p-Hydroxyphenylic ether.

Methoxybromethoxypropylbenzene.

β -Methoxynaphthalene.

Methoxyphenylcrotonic acid.

ω -Methoxy-1 : 3 : 4-xylenol.

Methylenedioxybenzene.

Methylic $\alpha\beta$ -dibromallylic ether.

Methylic methylacetylenic ether.

β -Naphthylic benzoylmethylic ether.

α - and β -Naphthylic ethylic oxides.

Ethers. See:—

β -Naphthyl methylic oxide.
 Phenetyldihydrophenotriazine.
 Phenetyltetrahydroquinazolines.
 α -Phenoxybutyric acid.
 Phenoxyethyl ethylic ether.
 Phenylbenzoin ethylic ether.
 Phenyl allylic ether.
 Phenyl *iso*-butylic ether.
 Phenyl β -chloroethyl ethylic ether.
 Phenyl ethylic ether.
 Phenyl β -ethoxyethyl ethylic ether.
 Phenyl ethylic ether.
 Phenyl methylic ether.
 Phenyl octylic ether.
 Phenyl propylic ether.
 Phenyl *iso*-propylic ether.
 Quercetin methyl ethers.
 Resacetophenone, ethyl ethers.
 Resorcinol diethyl ether.
 Tetramethylapionol.
 Tetraphenoxyquinol.
 Tetraphenoxyquinone.
 Tetrethoxytetraphenylethane.
 Tetrethoxytetraphenylethylene.
 Thymyl amylic ether.
 o -Tolylformimidoethyl ethylic ether.
 p -Tolyl allylic ether.
 o -, m -, p -, Tolyl amylic ethers.
 o -, m -, p -, Tolyl methylic ethers.
 Trimethoxycoumarin.
 Trimethoxycoumarincarboxylic acid.
 Trimethylapionolic acid.
 Trimethylpyrogallol.
 Veratrole.
 Veratrylamine.
 Etherthiorufic acid (EMMERLING), A., i, 127.
 Ethoxyacetic acid, copper and sodium salts, electrolysis of (WALKER), T., 1278, 1279.
 β -Ethoxyanethoil (HELL and HOLLENBERG), A., i, 354.
 Ethoxybenzyl oxime, ethylene ether (WERNER and GEMESEUS), A., i, 432.
 2-Ethoxybenzylideneacetone, 5-bromo- (KOSTANECKI and SCHNEIDER), A., i, 614.
 Ethoxybenzylideneacetophenone. See Phenyl ethoxystyryl ketone.
 4' : 1'-Ethoxybenzylphthalazine (BROMBERG), A., i, 579.
 β -Ethoxybromanethoil (HELL and HOLLENBERG), A., i, 354.
 β -Ethoxybutylamine: its picrate and other salts (BOOKMAN), A., i, 199.
 phenylthiocarbamide of (BOOKMAN), A., i, 199.
 γ -Ethoxybutylamine (BOOKMAN), A., i, 200.
 preparation of (LUCHMANN), A., i, 545.

β -Ethoxycinnamic acid and its ethylic salt (CLAISEN), A., i, 464.
 Ethoxycrotonic acid and its ethylic salt (CLAISEN), A., i, 463.
 Ethoxy- ψ -cumenol, dibromo-, and its benzoate (AUWERS and MARWEDEL), A., i, 150.
 Ethoxydimethyldiphenylamine, amido-. See Ethoxytolyltolylenediamines and Tolyethoxytolylenediamines.
 Ethoxyfumaric acid, ethylic salt (MICHAEL and BUCHER), A., i, 85.
 from ethylic acetylenedicarboxylate (MICHAEL and BUCHER), A., i, 599.
 conversion into oxalacetic acid (MICHAEL and BUCHER), A., i, 599.
 Ethoxyglutaconic acid and its ethylic salt (CLAISEN), A., i, 464.
 Ethoxymaleic acid, action of hydrochloric acid on (MICHAEL and BUCHER), A., i, 599.
 ethylic salt of (MICHAEL and BUCHER), A., i, 85.
 from ethylic acetylenedicarboxylate (MICHAEL and BUCHER), A., i, 599.
 Ethoxymaleic anhydride (MICHAEL and BUCHER), A., i, 599.
 from ethoxyfumaric acid (MICHAEL and BUCHER), A., i, 599.
 Ethoxymethyldiphenylamines, amido-. See Ethoxyphenyltolylenediamines, Ethoxytolylphenylenediamines, Phenylethoxytolylenediamines, and Tolyethoxyphenylenediamines.
 Ethoxymethyleneacetoacetic acid, ethylic salt (CLAISEN), A., i, 463.
 Ethoxymethyleneaniline (CLAISEN), A., i, 92.
 μ -Ethoxypentthiazoline, γ -bromo- (DIXON), T., 31; P., 1895, 217.
 Ethoxyphenyl-5-chloro- m -tolylamine: its nitrosamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
 2-Ethoxy-5-phenyl-3 : 4-dithiobiazolone (BUSCH), A., i, 705.
 p -Ethoxyphenyl- m -ethoxyphenylenediamine and its hydrochloride and thiocarbamide (JACOBSEN and MEYER), A., i, 27.
 m -Ethoxyphenylhydrazine, 2 : 4 : 6-*tri*-nitro-, acetylbenzylidene, o -hydroxybenzylidene, p -hydroxybenzylidene, and cinnamylidene derivatives (PURGOTTI), A., i, 363.
 p -Ethoxyphenylmalonamic acid and its ethylic salt (CASTELLANETA), A., i, 368.
 p -Ethoxyphenyloxamic acid and its

- ethylic salt (CASTELLANETA), A., i, 368.
- p*-Ethoxyphenyloxamide (WENGHÖFFER), A., i, 360.
- β -Ethoxy- β -phenylpropionic acid, α -iodo- (ERLENMEYER), A., i, 302.
- p*-Ethoxyphenylsuccinamic acid and its sodium salt (PIUTTI), A., i, 224.
- p*-Ethoxyphenylsuccinimide (PIUTTI), A., i, 223.
- compound of, with potassium iodide and iodine (PIUTTI), A., i, 364.
- p*-Ethoxyphenyl-*o*-tolylamine: its nitrosamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- (2)-*p*-Ethoxyphenyl-1 : 2 : 5-tolylenediamine: its hydrochloride and tylace derivatives (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- (5)-*p*-Ethoxyphenyl-1 : 2 : 5-tolylenediamine: its hydrochloride, diazoidide, acetyl, benzylidene, and hydroxybenzylidene derivatives (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 24.
- p*-Ethoxyphenyl-1 : 3 : 4-tolylenediamine: its azimide and stilbazonium base (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- β -Ethoxypropylene (CLAISEN), A., i, 464.
- 1' : 3'-Ethoxypropylisoquinoline and its salts (ALBAHARY), A., i, 699.
- 1-Ethoxyquinoline, methiodide and methochloride of (CLAUS and NOHL), A., i, 698.
- 3-Ethoxyquinoline and its nitro- and amino- derivatives (GRIMAU), A., i, 255.
- Ethoxy- β -resorecylic acid and its salts (GREGOR), A., i, 171.
- ethylic salt of (GREGOR), A., i, 616.
- Ethoxystyrene (CLAISEN), A., i, 464.
- Ethoxysuccinic acid, rotatory power of the ethylic salt of (WALDEN), A., ii, 136.
- 4-Ethoxy-*m*-tolyl-*p*-phenylenediamine and its acetyl derivative (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- 4-Ethoxy-*o*-tolyl-*p*-phenylenediamine: its acetyl derivatives and thiocarbamide (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- (2)-*p*-Ethoxy-*o*-tolyl-1 : 2 : 5-tolylenediamine: its sulphate and acetyl derivatives (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 26.
- (5)-*p*-Ethoxy-*o*-tolyl-1 : 2 : 5-tolylenediamine: its acetyl derivative and thiocarbamide (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 27.
- o*-Ethoxy-*m*-tolyl-1 : 2 : 5-tolylenediamine (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 26.
- p*-Ethoxy-*m*-tolyl-1 : 2 : 5-tolylenediamine: its monacetyl and diformyl derivatives and thiocarbamide (JACOBSEN, KEBER, HENRICH, and SCHWARZ), A., i, 26.
- ω -Ethoxy-1 : 3 : 4-xyleneol, tribrom- (AUWERS and CAMPENHAUSEN), A., i, 424.
- Ethyl α -hydroxypropyl ketone, density of (ANDERLINI), A., i, 203.
- Ethyl isopropyl ketone (GRÜCKSMANN), A., i, 333.
- Ethylacetoacetic acid, ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- Ethylacetonedicarboxylic acid, hydrazone of (PETRENKO - KRITSCHENKO and EPHRUSSI), A., i, 135.
- ethylic salt, hydrazone of (PETRENKO - KRITSCHENKO and EPHRUSSI), A., i, 135.
- Ethylallylacetic acid. See under Hexenoic acid.
- Ethylallylmalonic acid, ethylic salt, rate of hydrolysis of and preparation of (HJELT), A., i, 598.
- Ethylamine, discovery of (HOFMANN LECTURE), T., 656.
- preparation of, from aldehyde-ammonia and nascent hydrogen (JEAN), A., i, 77, 78.
- action of nitrous acid on (HOFMANN LECTURE), T., 698.
- action of sulphur dichloride on (LENGFELD and STIEGLITZ), A., i, 79.
- 5-Ethylamino-1-ethyltetrazole (THIELE and INGLE), A., i, 109.
- α -Ethylaminopropionic acid, action of carbamide on (DUVILLIER), A., i, 89.
- Ethylanemonin. See Anemonin.
- Ethylanhydrodibenzilacetoacetic acid and its potassium, silver, and barium salts (JAPP and LANDER), T., 739; P., 1895, 146.
- ethylic salt of (JAPP and LANDER), T., 738; P., 1895, 146.
- reduction of (JAPP and LANDER), T., 743; P., 1895, 146.
- Ethylaniline (HOFMANN LECTURE), T., 598.
- discovery of (HOFMANN LECTURE), T., 660.
- magnetic rotatory power, &c., of (PERKIN), T., 1099, 1208, 1244.
- o*-nitro- (MELDOLA and STREATFIELD), P., 1896, 51.
- Ethylbenzamide (BLACHER), A., i, 33.
- Ethylbenzoylpropionic acid (MUHR), A., i, 232.

- Ethylbenzene, magnetic rotatory power, &c., of (PERKIN), T., 1079, 1082, 1083, 1094, 1096, 1192, 1241.
- Ethylbenzhydroximic acid, ethylenic ether (WERNER and GEMSEUS), A., i, 432.
- Ethyl-*o*-benzoisulphinide, brom- (ECKENROTH and KOERPPEN), A., i, 439.
- Ethylcarbamide, nitro-, and its salts (THIELE and LACHMANN), A., i, 207.
- α -Ethylcarboxylglutaric acid, ethylic salt (AUWERS and TITHERLEY), A., i, 642.
- Ethylchlorimidocarbonic acid. See Imidocarbonic acid, ethylchloro-.
- Ethylcresols. See Methyl-ethylphenols.
- Ethylcusparine (BECKURTS), A., i, 66.
- Ethyleylene. See 1-Methylethyl-4-isopropylbenzene.
- Ethyl-desmotroposantonin (ANDREOCCI), A., i, 182.
- Ethylisodesmotroposantonin (ANDREOCCI), A., i, 182.
- Ethyl-desmotroposantonous acid and its ethylic salt (ANDREOCCI), A., i, 185.
- Ethylene, temperature of the flame of (LEWES), A., ii, 141.
- decomposition of, by heat (LEWES), A., i, 113.
- oxidation of, by palladinised copper oxide (CAMPBELL), A., ii, 171.
- explosive mixtures of air and (CLOWES), P., 1895, 201.
- estimation of, in gaseous mixtures (FRITSCH), A., ii, 678.
- separation of, from butylene (FRITSCH), A., ii, 678.
- Ethylene, tribrom- (HAWORTH and PERKIN), T., 177.
- tetraiod- (MEYER and PEMSEL), A., i, 517.
- Ethylenediamine (HOFMANN LECTURE), T., 684.
- mercuriochloride of (SCHNEIDER), A., i, 201.
- alkyl derivatives of (SCHNEIDER), A., i, 200.
- Ethylenedi-*o*-benzoisulphinide, preparation of (ECKENROTH and KOERPPEN), A., i, 439.
- Ethylenedihydroxylamine, hydrochloride (WERNER and GEMSEUS), A., i, 432.
- Ethylenediurethane (CURTIUS), A., i, 25.
- Ethylenetetracarboxylic acid, dipotassium dihydrogen salt (BISCHOFF), A., i, 469.
- ethylic salt (BISCHOFF), A., i, 468.
- methyl salt (BISCHOFF), A., i, 527.
- Ethylenethiouramil (FISCHER), A., i, 142.
- Ethylenic *o*-benzazoimide, *m*-nitro- (KRATZ), A., i, 365.
- Ethylenic dibromide, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- action of potassium carbonate on (HAWORTH and PERKIN), T., 175; P., 1896, 37.
- action of sodium phenoxide on (BENTLEY, HAWORTH, and PERKIN), T., 165.
- dichloride, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
- melting point of (V. SCHNEIDER), A., ii, 290.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- chlorobromide, melting point of (V. SCHNEIDER), A., ii, 290.
- action of sodium phenoxide on (BENTLEY, HAWORTH, and PERKIN), T., 165.
- chloriodide, melting point of (V. SCHNEIDER), A., ii, 290.
- Ethylethanetricarboxylic acid. See Pentanetricarboxylic acid.
- Ethylisoformanilide, preparation of (WHEELER and BOLTWOOD), A., i, 478.
- Ethylfumaric acid, ethylic salt (MICHAEL), A., i, 597.
- Ethylglycolic acid (CURTIUS), A., i, 338.
- α -Ethylglutaric acid and its anhydride (AUWERS and TITHERLEY), A., i, 642.
- α -Ethylglutaranil and anilic acid (AUWERS and TITHERLEY), A., i, 642.
- α -Ethylglutaro- β -naphthil and β -naphthilic acids (AUWERS and TITHERLEY), A., i, 643.
- α -Ethylglutaro-*p*-tolil and *p*-tolilic acids (AUWERS and TITHERLEY), A., i, 642.
- Ethylhydrazine (THIELE and MEYER), A., i, 407.
- Ethylic alcohol, synthesis of (CARO), A., i, 331.
- production of, from cellulose and wood (SIMONSEN), A., i, 331.
- action of light on (RICHARDSON and FORTEY), T., 1351; P., 1896, 164.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- boiling points of solutions of salts in (WOELFER), A., ii, 237.

- Ethylie alcohol, freezing points of dilute solutions of (JONES), A., ii, 155; (ABEGG), A., ii, 588.
 critical data of (BATELLI), A., ii, 150.
 vapour, connection between pressure, temperature, and volume of (BATELLI), A., ii, 150.
 vapour pressures of (BATELLI), A., ii, 150.
 action of, on the embryonic heart (PICKERING), A., ii, 46.
 amount of, in the blood during alcoholic poisoning (GRÉHANT), A., ii, 664.
 solubility and activity of ferments in (DASTRE), A., i, 398.
 action of hydrogen chloride on (CAIN), P., 1896, 12.
 sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
 estimation of, in wine by an optical method (RIEGLER), A., ii, 224.
 estimation of fusel oil in (GLASENAPP), A., ii, 277.
 See also Beer; Spirits; Wine.
 Ethylie bromide, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 Ethylie ether, action of light on (RICHARDSON and FORTEY), T., 1352; P., 1896, 165.
 heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 phenomena observed at the critical temperature of (ZAMBIASI), A., ii, 234.
 containing dissolved substances, diminished solubility in water of (TOLLGCKO), A., ii, 637.
 action of, on nerve (WALLER), A., ii, 52.
 Ethylie ether, *di*chlor-, action of amidothiazole on (HANTZSCH and WILD), A., i, 285.
 Ethylie iodide, preparation of (ORLOFF), A., i, 635.
 magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
 heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 velocity of the reaction of, with silver nitrate in alcoholic solution (CHIMINELLO), A., ii, 354.
 Ethylie nitrosoferrocyanide (HOFMANN), A., i, 269.
 Ethylidene-*o*-aminobenzoic acid (NIEMENTOWSKI and ORZECOWSKI), A., i, 187.
 Ethylidene-*o*-aminobenzoic acid, *tri*-chloro- (NIEMENTOWSKI and ORZECOWSKI), A., i, 187.
 Ethylidenebisacetonedicarboxylic acid, ethylie salt of (KNOEVENAGEL), A., i, 212.
 Ethylidenephénylhydrazine. See Acetaldehydephenylhydrazone.
 Ethylidenecyclopropane (GUSTAVSON), A., i, 669.
 β -iodo- (*exo*-) (GUSTAVSON), A., i, 669.
 Ethylidenepropionic acid, sodium salt, action of sodium hydroxide on (SPEYER), A., i, 128.
 Ethylidenetrimethylene. See Ethylidenecyclopropane.
 Ethylidene iodide, action of moist metallic oxides on (CARO), A., i, 331.
 action of water on (CARO), A., i, 331.
 action of potash on (CARO), A., i, 331.
 Ethylimidocarbonic acid, ethylie salt of (NEF), A., i, 73.
 Ethylimidochlorocarbonic acid, ethylie salt of (NEF), A., i, 73.
 Ethylimidochloroformyl cyanide (NEF), A., i, 74.
 Ethylimidoecyanocarbonic acid, ethylie salt of (NEF), A., i, 73.
 Ethylimine, thio- (LENGFIELD and STIEGLITZ), A., i, 79.
 Ethylketole (WOLFF), A., i, 87.
 bromo- (WOLFF), A., i, 87.
 phenylhydrazone and osazone of (WOLFF), A., i, 87.
 Ethyllaetylcarbamide. See Methyl-ethylhydantoin.
 Ethylmalonic acid, ethylie salt, rate of formation of (BISCHOFF), A., i, 85.
 hydrolysis of (HJELT), A., i, 205.
 action of ethylenic bromide on (BISCHOFF), A., i, 129.
 sodio-, ethylie salt, action of ethylie α -bromobutyrate on (BISCHOFF), A., i, 467.
 action of ethylie α -bromisobutyrate on (BISCHOFF), A., i, 467.
 action of ethylie chloro- and bromomalonates on (BISCHOFF), A., i, 528.
 action of ethylie α -bromopropionate on (BISCHOFF), A., i, 467.
 action of ethylie α -bromisovalerate on (BISCHOFF), A., i, 467.
 action of ethylie β -iodopropionate on (AUWERS and TITHERLEY), A., i, 642.

- Ethylmauveine, discovery of (HOFMANN LECTURE), T., 618.
- Ethylmesitylene. See 1 : 3 : 5 : 2-Tri-methylethylbenzene.
- o*-Ethylmethylbenzoylpropionic acid (MÜHR), A., i, 232.
- Ethylnitramine, action of β -naphthol and aluminium on (THIELE and MEYER), A., i, 407.
- Ethylnitrolic acid, action of ethylic chloroformate on (NEF and JONES), A., i, 460, 461.
- Ethyloxamide and the biuret reaction (SCHIFF), A., i, 632.
- Ethylphenanthridine and its salts (PICTET and HUBERT), A., i, 53, 483.
- Ethylphenonaphthazone and its sulphate (KEHRMANN and FÜHNER), A., i, 511.
- Ethyl-*o*-phenylenediamine, condensation of, with hydroxynaphthaquinone and dihydroxyquinone (KEHRMANN and FÜHNER), A., i, 511.
- Ethylphthalimide (BLACHER), A., i, 33.
- Ethylcyclopropane, iodo- (GUSTAVSON), A., i, 669.
- Ethylpropiohydantoin. See Methyl-ethylhydantoin.
- Ethylpropylisobutylammonium chloride, optically active (HOFMANN LECTURE), T., 671.
- Ethylisopropylisobutylphosphine and its methiodide (HOFMANN LECTURE), T., 682.
- Ethylpropyl- ψ -nitrole. See Pentane, β -nitro- β -nitroso-.
- Ethylsafranol (JAUBERT), A., i, 325.
- Ethylsaligenylcamphor, crystallography of (MINGUIN), A., i, 694.
- Ethylsantonous acid and its ethylic salt (ANDREOCCI), A., i, 183.
- Ethylsantonous acid and its ethylic salt (ANDREOCCI), A., i, 184.
- Ethylsantonous acid, racemic (ANDREOCCI), A., i, 185.
- Ethylsuccinic acid, ethylic salt (MICHAEL), A., i, 597.
- Ethylsuccinimide. See Succinethylinide.
- Ethylsulphonic acid, methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
- Ethyltaurine (BOOKMAN), A., i, 200.
- Ethylthiazoline μ -hydrosulphide (BOOKMAN), A., i, 200.
- Ethylthienyltriphenylmethane (WEISSE), A., i, 565.
- Ethylthiocarbimide, melting point of (v. SCHNEIDER), A., ii, 290.
- action of hydrogen sulphide on (PONZIO), A., i, 636.
- Ethyl- α -thiocarbonic acid, potassium salt of (DORAN), T., 341.
- Ethyltoluene. See Methyl-ethylbenzene.
- Ethyltriethylphosphonium bromide, brom-, preparation of (HOFMANN LECTURE), T., 678.
- action of trimethylamine and triethylamine on (HOFMANN LECTURE), T., 679.
- Ethyltrimethylene. See Ethylcyclopropane.
- Ethylvalerolactone. See Heptolactone.
- Eucalyptus oil, hydrocarbon from (WALLACH and HERBIG), A., i, 101.
- Euchresta Horsfieldii*, occurrence of cytisine in (PLUGGE), A., ii, 61.
- Eudiometer, compensatory (VON THAN), A., ii, 621.
- Eugenol, synthesis and constitution of (MOUREAU), A., i, 215.
- magnetic rotatory power, &c., of (PERKIN), T., 1127, 1142, 1247.
- thio- (VOSWINKEL), A., i, 378.
- iso*-Eugenol, magnetic rotatory power &c., of (PERKIN), T., 1127, 1147, 1247.
- ethyl ether dibromide, action of sodium ethoxide on (HELL and PORTMANN), A., i, 357.
- methyl and ethyl ether dibromides, ketones from (HELL), A., i, 169.
- Eugenolacetic acid and its salts (GASSMANN), A., i, 424.
- iso*-Eugenolacetic acid (GASSMANN), A., i, 424.
- Euppitonic acid. See Hexamethoxyrosolic acid.
- Eurhodines, nomenclature of (JAUBERT), A., i, 326.
- Eurotiopsis Gayoni*, fermentation of maltose by (LABORDE), A., ii, 322.
- Entropic series of elements (ORTLOFF), A., ii, 355.
- Euxanthone, disodium, dipotassium, calcium, and barium derivatives of (MANN and TOLLENS), A., i, 449.
- non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.
- Euxenite (?) from Lake Ladoga (ERDMANN), A., ii, 570.
- from Norway (ERDMANN), A., ii, 570.
- Evansite from Tasmania (SMITH), A., ii, 34.
- Excelsin, the proteid of Brazil nut (OSBORNE and CAMPBELL), A., i, 716.
- Expansion of solutions. See Heat.
- Explosion of endothermic gases (MAQUENNE), A., ii, 87.
- of mixtures of cyanogen, oxygen, and

- nitrogen. rate of (DIXON, STRANGE, and GRAHAM), T., 761; P., 1896. 53.
- Explosion wave in chlorine peroxide, rate of the (DIXON and HARKER), T., 791; P., 1896, 57.
- Explosive mixtures of gases with air (CLOWES), P., 1895, 201.
- Extraction apparatus (v. RIJN), A., ii, 17.
- for liquids (KURBATOFF), A., ii, 355.

F.

- "Factis" (caoutchouc substitute), brown compound of, with sulphur (HENRIQUES), A., i, 204.
- Fæces, excretion of calcium salts in the (REY), A., ii, 489.
- koprosterol from (BONDZYŃSKI), A., ii, 329.
- sources of xanthine bases in (WEINTRAUD), A., ii, 490.
- urobilin from human (GARROD and HOPKINS), A., i, 712.
- Fahlore. See Tetrahedrite and Tennantite.
- Fat formation, influence of proteids, fat, starch, and cellulose on (LEHMANN), A., ii, 262.
- absorption of, from alimentary canal (LEVIN), A., ii, 376.
- influence of, on metabolism (WICKE and WEISKE), A., ii, 535.
- relation of, to the liver (NOËL-PATON), A., ii, 316.
- conversion of, into glycogen in the silkworm (COUVREUR), A., ii, 317.
- composition of, from milk of different animals (SOLBERG), A., ii, 378.
- human, composition of (MITCHELL), A., ii, 570.
- decr, examination of (BECKURTS and OELZE), A., ii, 81.
- Fats, sulphur additive compounds of, and their compounds with sulphur chloride (ALTSCHUL), A., i, 127.
- development of rancidity in (SPAETH), A., i, 664.
- colour tests for (LEWKOWITSCH), A., ii, 398.
- examination of, by the refractometer (BECKURTS and HEILER), A., ii, 81.
- iodine numbers of (SCHWEITZER and LUNGWITZ), A., ii, 398.
- Reichert-Meißl numbers of (HENRIQUES), A., ii, 281.
- saponification in the cold, numbers, &c. (HENRIQUES), A., ii, 281.
- Fats, estimation of, in milk (WELLER), A., ii, 228; (LONGI), A., ii, 228.
- in pasteurised milk, estimation of, by creamometers (CAZENEUVE and HADDON), A., ii, 130.
- estimation of, in cheese (HENZOLD), A., ii, 680; (STUTZER), A., ii, 684.
- solid, estimation of, in mixtures of fats and oils (WAINWRIGHT), A., ii, 550.
- animal, estimation of solid fat in mixtures of (WAINWRIGHT), A., ii, 550.
- vegetable, estimation of solid fat in mixtures of (WAINWRIGHT), A., ii, 550.
- Fats. See also Butter; Cacao butter; Lard; Milk; Wool-grease.
- Fatty compounds, unsaturated, action of sulphur on (ALTSCHUL), A., i, 126.
- Fayalite from Massachusetts (PENFIELD and FORBES), A., ii, 373.
- "Feather ore" (LASPEYRES and KAISER), A., ii, 660.
- Felspar from mica-syenite in Saxony (HENDERSON), A., ii, 533.
- from Lyttelton, N.Z. (MARSHALL), A., ii, 193.
- See also Albite; Anorthite; Labradorite; Microcline; Oligoclase; Orthoclase.
- Felspar group (GLINKA), A., ii, 568.
- Felspars (albite-anorthite), isomorphism of (WALLERANT), A., ii, 189.
- from the nephelite-syenite of Greenland (USSING), A., ii, 372.
- of igneous rocks (FOUQUÉ), A., ii, 532.
- Fenchone from oil of anise (BOUCHARDAT and TARDY), A., i, 449.
- Fennel oil, hydrocarbon from (WALLACH and HERBIG), A., i, 101.
- Fergusonite from Norway (ERDMANN), A., ii, 570.
- Ferment, oxidising, of *Boletus cyaneus* (BOURQUELOT and BERTRAND), A., ii, 383.
- of cellulose (OMELIANSKI), A., ii, 203.
- diastatic, in sugar-beet (GONNERMANN), A., ii, 381.
- diastatic, non-conversion of, into glycolytic (NASSE and FRAMM), A., ii, 398.
- soluble, in organs after death (BRONDI), A., ii, 616.
- sugar-forming, in blood-serum (BOURQUELOT and ELEY), A., ii, 119.
- Fermentation, influence of aëration and temperature on (RIETSCH and HEISELIN), A., ii, 53.

- Fermentation by yeast, influence of oxygen and hydrogen on (RAPP), A., ii, 668.
- use of thymol and toluene to prevent (FISCHER and LINDNER), A., i, 196.
- of *Asphodelus ramosus* and *Scilla maritima* (RIVIÈRE and BAILHACHE), A., ii, 203.
- of furfuroids by yeast (CROSS, BEVAN, and SMITH), T., 816; P., 1896, 96.
- of furfuroids from barley straw by yeast (CROSS, BEVAN, and SMITH), T., 1607; P., 1896, 174.
- of musts with elliptical and apiculated yeasts (RIETSCH and HEISELIN), A., ii, 53.
- of wine, use of pure cultivated yeast in (MÜLLER), A., ii, 201.
- of sugars by Friedländer's pneumococcus (GRIMBERT), A., ii, 322.
- of cane sugar with different yeasts (HIEPE), A., ii, 320.
- of maltose by *Eurotiosis Gayoni* (LABORDE), A., ii, 322.
- of polysaccharides (FISCHER and LINDNER), A., i, 195.
- of urea, products found in (ADENEY), A., ii, 326.
- of uric acid by micro-organisms (GÉRARD), A., ii, 668.
- fermentation, alcoholic, heat developed by (BOUFFARD), A., ii, 12.
- action of *Aspergillus niger* on (BOURQUELOT and HÉRISSEY), A., ii, 321.
- and lactic, of maltose (BOURQUELOT), A., i, 111.
- fermentation, lactic, action of metallic salts on (CHASSEVANT), A., ii, 122.
- fermentation, mannitol, in Sicilian wines (BASILE), A., ii, 121.
- fermentative changes in natural and polluted waters (ADENEY), A., ii, 323.
- ferments, action of unorganised (TAMMANN), A., ii, 243.
- solubility and activity of, in alcohol (DASTRE), A., i, 398.
- ferments. See also Cytase; Diastase; Enzymes; Fibrin ferment; Gaultherase; Lactase; Oxydases; Tyrosinase; Yeast.
- erratin, absorption of, in the alimentary canal (TIRMANN), A., ii, 487.
- erric. See under Iron.
- errophényl mercaptide, linitroso-, preparation of (HOFMAN and WIEDE), A., i, 291.
- errous. See under Iron.
- ertilisers. See Manures, under Agricultural chemistry (Appendix).
- Ferula*, sagapen from a Persian (Hohenadel), A., i, 58.
- Fever, presence of albumose in urine during (KREHL and MATTHES), A., ii, 667.
- Fibrin, vegetable, constitution of (FLEURENT), A., i, 112.
- Fibrin-ferment, nature of (PEKELHARING), A., ii, 488.
- Fibrolite from Bohemia (KATZER), A., ii, 188.
- Filter, convenient form of hot (KREIDER), A., ii, 161.
- Filtration at high temperatures, apparatus for (POSTOÉFF), A., ii, 516.
- of crystalloids from colloids (MARTIN), A., ii, 665.
- Fiorite from Tuscany (DAMOUR), A., ii, 109.
- Fire-clays, estimation of sodium and potassium in (CAMERON), A., ii, 392.
- Firedamp, argon and nitrogen in (SCHLOESING), A., ii, 655.
- Fisetin, identity of, with colouring matter of *Querbracho colorado* (PERKIN and GUNNELL), T., 1306; P., 1896, 158.
- relation of, to luteolin (HERZIG), A., i, 494.
- acetyl and benzoyl derivatives of (PERKIN and GUNNELL), T., 1305; P., 1896, 158.
- Fish oils, analysis of (VEDRÖDI), A., ii, 81.
- Flames (EDER), A., ii, 287.
- structure of hydrocarbon (LEWES), T., 235; P., 1896, 2; (SMITHELLS), P., 1896, 3.
- of hydrocarbons, cause of the luminosity of (LEWES), A., ii, 141; (SMITHELLS), P., 1896, 3.
- acetylene theory of the luminosity of hydrocarbon (LEWES), T., 226; P., 1896, 1; (SMITHELLS), P., 1896, 3.
- temperature of certain (LEWES), T., 228; P., 1896, 2; (HARTLEY), T., 842-844; P., 1896, 98; (HARCOURT, THORPE, RÜCKER, SMITHELLS), P., 1896, 3-5.
- of the Bunsen burner (BOHN), A., ii, 140.
- of cyanogen and carbonic oxide undergoing explosive combustion, duration of the (DIXON, STRANGE, and GRAHAM), T., 763; P., 1896, 54.
- Flask, measuring (BILTZ), A., ii, 671.
- Flavopurpurin, discovery of (HOFMANN LECTURE), T., 633.

- Flavopurpurin, hydroxylation of (WACKER), A., i, 694.
- Flesh formation, influence of proteids, fat, starch, and cellulose on (LEHMANN), A., ii, 262.
- Flesh, mineral constituents of (KATZ), A., ii, 377.
- Flint and steel, temperature of sparks from (CHESNEAU), A., ii, 407.
- Fluorflavine and its hydrochloride (HINSBERG and POLLAK), A., i, 394.
- chloro- (HINSBERG and POLLAK), A., i, 394.
- Fluorene, action of chlorine or bromine on (GRAEBE and VON MANTZ), A., i, 442.
- oxidation of (HODGKINSON), P., 1896, 110.
- Fluorenone (*diphenylene ketone*) (STAEDEL), A., i, 374.
- and its oxime (KERP), A., i, 238.
- phenylhydrazone of (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- Fluorenone, β -dibromo-, phenylhydrazone of (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- δ -dibromo-, and its phenylhydrazone (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- chloro-, and its phenylhydrazone (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- β -dichloro-, and its phenylhydrazone (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- nitro-, phenylhydrazone of (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- α -dinitro-, phenylhydrazone of (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- β -dinitro-, and its phenylhydrazone (GOLDSCHMIEDT and SCHRANZHOFER), A., i, 174.
- Fluorescein, ethylic ether, quinoidal monacetyl derivative of (HERZIG and MEYER), A., i, 237.
- tetrabromo-, (*eosin*), composition of (HOFMANN LECTURE), T., 626.
- detection of, in wines (BELAR), A., ii, 630.
- allo-Fluorescein (PAWLEWSKI), A., i, 50.
- 3-Fluoresceincarboxylic acid (GRAEBE and LEONHARDT), A., i, 437.
- 3-Fluoresceincarboxylic anhydride and its acetyl derivative (GRAEBE and LEONHARDT), A., i, 438.
- 6-Fluoresceincarboxylic acid (GRAEBE and LEONHARDT), A., i, 437.
- Fluoresceinsulphone. See Sulphone-fluorescein.
- Fluorine :—
- Hydrogen fluoride, gaseous, action of, on salts of elements of the fifth group (SMITH and MEYER), A., ii, 164.
- estimation of, volumetrically (STAHL), A., ii, 621.
- effect of, on algæ (WYPLEL), A., ii, 266.
- Fluorine, detection of, in beer (BRAND), A., ii, 447; (HEFELMANN and MANN), A., ii, 497.
- detection of, in wine (NIVIÈRE and HUBERT), A., ii, 497.
- estimation of, in silicates (REICH), A., ii, 531.
- Fluoro-derivatives. See :—
- Benzene.
- Benzoic acid.
- Food, mineral, of lower fungi (MOLISCH), A., ii, 207.
- presence of copper in (LEHMANN), A., ii, 486.
- amount of iron in (STOCKMAN), A., ii, 43.
- anti-peptone from glands as a (ELLINGER), A., ii, 536.
- casein as a (MARCUSE), A., ii, 663.
- mannan as a (TSUJI), A., ii, 44.
- sugar as a (STOKVIS, MOSSO, and HARLEY), A., ii, 44.
- Food. See also under Agricultural chemistry (Appendix).
- Formaldehyde, discovery of (HOFMANN LECTURE), T., 706.
- production of gaseous (BROCHET), A., i, 345.
- occurrence of a condensation product of pentose with, in cellulose (CROSS, BEVAN, and SMITH), T., 813; P., 1896, 96.
- hydrazone of (WALKER), T., 1279.
- reactions of, with various reagents (LEE), A., i, 124.
- action of ammonium cyanide on (CURTIUS), A., i, 337.
- action of halogens on (BROCHET), A., i, 276, 277.
- action of nitric acid on (BACH), A., i, 636.
- action of, on white of egg (BLUM), A., i, 659.
- action of phenylhydrazine on (WALKER), T., 1280.
- action of water on (DELÉPINE), A., i, 637.
- compounds of, with polyhydric alcohols (SCHULZ and TOLLENS), A., i, 115.
- condensation of, with *o*-aminobenzyl-phenylhydrazine (BUSCH), A., i, 508.

- Formaldehyde, condensation of, with anhydroenneaheptitol (APEL and WITT), A., i, 405.
condensation of, with piperazine (ROSDALSKY), A., i, 257.
- Formaldehyde, *trithio*-, preparation of (HOFMANN LECTURE), T., 707.
- Formaldehyde (*formalin*), detection of (GOLDSCHMIDT), A., i, 543; (ROMŸN), A., ii, 280; (RICHMOND and BOSELEY), A., ii, 583; (HEHNER), A., ii, 583.
estimation of (KLAR), A., ii, 226; (SMITH), A., ii, 583.
- Paraformaldehyde, condensation of, with pyruvic acid (KALTWASSER), A., i, 670.
- Formamide, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
sodium, silver derivatives (FREER and SHERMAN), A., i, 612.
- Formamidobenzene, bromo- (SLOSSON), A., i, 216.
chloro- (SLOSSON), A., i, 216.
- 2-Formamidodiphenyl (PICTET and HUBERT), A., i, 52, 483.
- Formanilide, preparation of (LUXMOORE), T., 190; P., 1895, 149.
and its derivatives (CLAISEN), A., i, 91.
electrical conductivity of solutions of (EWAN), T., 96; P., 1896, 8.
magnetic rotatory power, &c., of (PERKIN), T., 1114, 1216, 1246.
action of caustic soda on (HOFMANN LECTURE), T., 704.
action of ethylic chlorocarbonate on (FREER and SHERMAN), A., i, 612.
mercury compound of (WHEELER and MCFARLAND), A., i, 609.
mercury bromide (WHEELER and MCFARLAND), A., i, 609.
mercury chloride (WHEELER and MCFARLAND), A., i, 609.
mercury acetate. See Acetic acid, formanilide mercury salt of.
sodium derivative, preparation of (CLAISEN), A., i, 92.
sodium ethoxide (COHEN and ARCHDEACON), T., 94; P., 1896, 8.
- Formanilide, *p*-chloro- (SLOSSON), A., i, 216.
2:4-dichloro- and its silver salt (WHEELER and BOLTWOOD), A., i, 478.
iodo-, mercury compound of (WHEELER and MCFARLAND), A., i, 609.
thio-, preparation of (HOFMANN LECTURE), T., 710.
electrical conductivity of the sodium salt of (EWAN), T., 97; P., 1896, 8.
- Formazyl hydride (WALTHER), A., i, 166.
preparation of (CLAISEN), A., i, 92.
- Formazylformic acid, ethylic salt (VON PECHMANN), A., i, 679.
- Formazyl-*p*-hydroxybenzene (WEDEKIND), A., i, 631.
- Formazyl-*p*-methoxybenzene (WEDEKIND), A., i, 630.
- Formazylsulphonic acid, potassium salt (VON PECHMANN), A., i, 679.
p-bromo- (VON PECHMANN), A., i, 680.
- Formic acid, specific heat of solid and liquid (MASSOL and GUILLOT), A., ii, 8.
heat of evaporation of (MARSHALL), A., ii, 589.
electrolytic dissociation of salts dissolved in (ZANNINOVICH-TESARIN), A., ii, 352.
and water, distillation of a mixture of (SOREL), A., i, 463.
condensation of, with pentoses (CROSS, BEVAN, and SMITH), T., 813; P., 1896, 96.
- Formic acid, amyllic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
action of sodium on (FREER and SHERMAN), A., i, 162.
crotonylic salt (CHARON), A., i, 661.
ethylic salt, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (RAMSAY and MARSHALL), A., ii, 349.
molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
action of sodium on (FREER and SHERMAN), A., i, 612.
ethylic ortho-salt, action of ethylic acetoacetate on (CLAISEN), A., i, 463.
action of, on primary aromatic amines (WALTHER), A., i, 534.
methylic salt, heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349; (BECKMANN, GERNHARDT, and FUCHS), A., ii, 237.
propylic salt, heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
- Formic acid, amino-, methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
chloro-, *m*-diethylaminophenylic salt of (MEYENBURG), A., i, 292.
chloro-, *m*-dimethylaminophenylic salt of (MEYENBURG), A., i, 292.

- Formic acid, estimation of (FREYER), A., ii, 80.
- Formimide, hydrochloride of ethylic ether of, probably a homogeneous substance (PINNER), A., i, 9.
- Formobenzanilide, preparation of (WHEELER and MCFARLAND), A., i, 609.
- Formobenzo-*p*-toluidide (WHEELER and MCFARLAND), A., i, 609.
- Formocarbamide (VON GORSKI), A., i, 667.
action of malic, malonic, oxalic, racemic, and succinic acids on (VON GORSKI), A., i, 668.
- Formomalonuric acid (VON GORSKI), A., i, 667.
- Formomaluric acid (VON GORSKI), A., i, 668.
- Formo- α -naphthylamide, mercury compound of (WHEELER and MCFARLAND), A., i, 609.
- Formophenyldiethylhydrazide (FREER and SHERMAN), A., i, 612.
- Formophenylhydrazide, preparation of (CLAISEN), A., i, 92.
disodium derivative of (COHEN and ARCHDEACON), T., 95; P., 1896, 8.
- α -Formophenylhydrazide, β -ethyl derivative of (FREER and SHERMAN), A., i, 611.
- β -Formophenylhydrazide, sodio-, ethyl derivative of (FREER and SHERMAN), A., i, 611.
- "Formopyrinc," identity of, with methylenediantipyrine (STOLZ), A., i, 628.
- Formoracemuric acid (VON GORSKI), A., i, 668.
- Formosuccinuric acid and its methylic salt (VON GORSKI), A., i, 668.
- Formo-*p*-toluidide, mercury compound of (WHEELER and MCFARLAND), A., i, 609.
mercury chloride (WHEELER and MCFARLAND), A., i, 609.
- Formoxaluric acid (VON GORSKI), A., i, 668.
action of heat on (VON GORSKI), A., i, 668.
- Formylacetic acid, sodio-ethylic salt, action of phenylic isocyanate on (MICHAEL), A., i, 594.
- Formyladipic acid and its hydrolysis (WILLSTÄTTER), A., i, 267.
- Formyl-*o*-dinitrodibenzylbenzidine (TROEGER and EGGERT), A., i, 563.
- Formyl-*p*-ethoxy-*m*-tolyl-1 : 2 : 5-tolylenediamine (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 26.
- Formyl- α -hydroxy- $\alpha\beta$ -diphenylethylamine. See α -Hydroxy- $\alpha\beta$ -diphenylethylamine, formyl.
- Formylia. See Ethylenediamine.
- Formylphenylacetic acid, ethylic salt of (WISLICENUS), A., i, 369, 552.
constitution of (BRÜHL), A., i, 555.
tautomeric forms of (TRAUBE), A., i, 593.
- Formylthymotic acid (HEYL and MEYER), A., i, 147.
- Forsterite from Monte Somma (ARZRUNI), A., ii, 309.
- Fractionating column (BERLEMONT), A., ii, 415.
- Freezing point. See Heat.
- French purple, discovery of (HOFMANN LECTURE), T., 608.
- Frog, cutaneous respiration in the (REID), A., ii, 42.
- Fructose. See Levulose.
- Fuchsine. See Rosaniline.
- Fuels, determination of the heat of combustion of (HEMPEL), A., ii, 556.
- Fuller's earth from New South Wales (CARD), A., ii, 262.
- Fumaric acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
sublimation temperature of, under small pressure (KRAFFT and DYES), A., ii, 89.
amylic salt, rotatory power of (WALDEN), A., ii, 633.
ethylic salt, action of ethylic iodide and zinc on (MICHAEL), A., i, 597.
hydroxylamine salt of (TANATAR), A., i, 520.
- Fumaric acid, bromo- (MICHAEL), A., i, 131.
melting point of and behaviour towards aqueous potash of (MICHAEL), A., i, 131.
silver salt, action of heat on the aqueous solution of (MICHAEL), A., i, 131.
amylic salt, rotatory power of (WALDEN), A., ii, 633.
- di*bromo-, ethylic salt, loss of halogen by (MICHAEL and CLARK), A., i, 132.
- chloro-, action of aqueous potash on (MICHAEL), A., i, 131.
action of hydrazine and phenylhydrazine on (RUHEMANN), T., 1396; P., 1896, 166.
amylic salt, rotatory power of (WALDEN), A., ii, 633.
ethylic salt, condensation of, with ethylic acetoacetate (RUHEMANN and TYLER), T., 532; P., 1896, 73.

Fumaric acid, chloro-, ethylic salt, condensation of, with ethylic benzoylacetate (RUHEMANN and WOLFF), T., 1384; P., 1896, 166.
condensation of, with ethylic methylacetoacetate (RUHEMANN and WOLFF), T., 1386; P., 1896, 166.

Fumaric peroxide (VANINO and THIELE), A., i, 597.

Fumarylazoimide (RADENHAUSEN), A., i, 139.

Fumarylcarbamic acid, ethylic salt (RADENHAUSEN), A., i, 139.

Fumarylhydrazide (RADENHAUSEN), A., i, 138.

Fungi found on different grapes (MÜLLER), A., ii, 201.
lower, mineral food of (MOLISCH), A., ii, 207.
nutrition of, by different organic compounds (LOEW), A., ii, 55.
hydrolysing property of emulsin from (BOURQUELOT and HÉRISSEY), A., i, 195.
oxidising ferments of certain (BOURQUELOT and BERTRAND), A., ii, 383.
non-formation of tannin in (NACMANN), A., ii, 538.
laccase in (BOURQUELOT and BERTRAND), A., ii, 268.

Funnel, automatic hot-water (POSTOÉEFF), A., ii, 516.

Furazandicarboxylic acid from benzenedioxime (ZINCKE), A., i, 430.

Furfuraldehyde, preparation of, from glycuronic acid (RAYMANN and ŠTLC), A., i, 459.
percentage of, in cellulose, and soluble products of cellulose (CROSS, BEVAN, and SMITH), T., 807; P., 1896, 96.
action of ethylic orthoformate on (CLAISEN), A., i, 464.
condensation of, with acetophenone (KOSTANECKI and PODRAJANSKY), A., i, 688.

Furfuroids, condition of, at different stages of plant (CROSS, BEVAN, and SMITH), T., 1609; P., 1896, 175.
relation of, to total carbohydrates from barley straw (CROSS, BEVAN, and SMITH), T., 1606; P., 1896, 174.
in barley, effect of weather on (CROSS, BEVAN, and SMITH), A., ii, 122.
oxidation of, by bromine (CROSS, BEVAN, and SMITH), T., 815; P., 1896, 96.

Furfuroids, fermentation of, by yeast (CROSS, BEVAN, and SMITH), T., 816; P., 1896, 96.
osazones and yeast, fermentation of, from barley straw (CROSS, BEVAN, and SMITH), T., 1607; P., 1896, 174.
reaction of, with hydrogen peroxide (CROSS, BEVAN, and SMITH), T., 1607; P., 1896, 174.
estimation of, in plants (CROSS, BEVAN, and SMITH), T., 1604; P., 1896, 174.
separation of, from cellulose by acid hydrolysis (CROSS, BEVAN, and SMITH), T., 806; P., 1896, 96.

Furfurylideneacetophenone (KOSTANECKI and PODRAJANSKY), A., i, 689.

Furfurylidenediacetophenone (KOSTANECKI and PODRAJANSKY), A., i, 689.

Furfurylidenemalonic acid, ethylic salt, additive compound of, with piperidine (GOLDSTEIN), A., i, 436.

Furnace, simple form of electric (WALKER), A., ii, 462.

Fusel oil, estimation of, in rectified spirits (GLASENAPP), A., ii, 277; (STUTZER and MAUL), A., ii, 504.

G.

Gabbro, banded, from Skye (GEIKIE and TEALL), A., ii, 191.

Gadolinite from Norway (ERDMANN), A., ii, 570.

Galaetan, occurrence of, in *Sterculia plantanifolia*, *Vitis pentaphylla*, *Opuntia* and other plants (YOSHIMURA), A., ii, 60.

Paragalactan, occurrence of, in cell-wall of cotyledons (SCHULZE), A., ii, 619.

Galactitol from yellow lupin seed (RITTHAUSEN), A., i, 405.
hydrolysis of (RITTHAUSEN), A., i, 405.

β -Galactochloral and its tetracetyl and tribenzoyl derivatives (HANRIOT), A., i, 519.
oxidation of (HANRIOT), A., i, 519.

Galactose, action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
action of dilute alkalis on (DE BRUYN), A., i, 116.
action of lead hydroxide and potash on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
action of methyl alcoholic ammonia

- on (DE BRUYN and VAN LEENT), A., i, 119.
- Galactose, action of chloral on (HARRIOT), A., i, 519.
- action of glyoxylic acid on (BOETTINGER), A., i, 6.
- estimation of, by Fehling's solution (KJELDAHL), A., ii, 581.
- reducing power of, on aminoniacal silver nitrate (HENDERSON), T., 152; P., 1896, 9.
- Galactose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Galactose-amine (DE BRUYN and VAN LEENT), A., i, 119.
- action of methylic alcohol and ether on (DE BRUYN and VAN LEENT), A., i, 587.
- Galactose-amine-ammonia (DE BRUYN and VAN LEENT), A., i, 119.
- Galactose-aminoguanidine chloride and sulphate (WOLFF), A., i, 78.
- Galactose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Galactose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Galactosebenzylmercaptal (LAWRENCE), A., i, 272.
- Galactosecarboxylic acid. See α -Galalheptonic acid.
- Galactose-ethylenemercaptal (LAWRENCE), A., i, 272.
- Galactose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Galactosenaphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Galactosetrimethylenemercaptal (LAWRENCE), A., i, 272.
- α -Galalheptitol (FISCHER), A., i, 118.
- α -Galalheptonic acid (galactosecarboxylic acid) (FISCHER), A., i, 117.
- phenylhydrazide of (FISCHER), A., i, 117.
- β -Galalheptonic acid (FISCHER), A., i, 118.
- oxidation product of, with nitric acid (FISCHER), A., i, 118.
- phenylhydrazide of (FISCHER), A., i, 118.
- α -Galalheptose and its osazone and phenylhydrazone (FISCHER), A., i, 117.
- β -Galalheptose (FISCHER), A., i, 118.
- Galaoctitol (FISCHER), A., i, 118.
- Galaoctonic acid (FISCHER), A., i, 118.
- lactone of (FISCHER), A., i, 118.
- phenylhydrazide of (FISCHER), A., i, 118.
- Galactose and its osazone and phenylhydrazone (FISCHER), A., i, 118.
- Galena coating cerussite from Montana (HOBBS), A., ii, 33.
- from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- zinciferous, from Broken Hill, N.S.W. (LIVERSIDGE), A., ii, 658.
- analysis of (ECKENROTH), A., ii, 501.
- Galipea officinalis*, alkaloids of (BECKURTS), A., i, 66.
- Gallacetophenone. See Alizarin-yellow.
- Gallie acid, occurrence of, in *Quercus bracho colorado* (PERKIN and GUNNELL), T., 1307; P., 1896, 158.
- occurrence of, in sumach (PERKIN and ALLEN), T., 1302; P., 1896, 157.
- constitutional formula of (SCHIFF), A., i, 370.
- oxidation of (BERTRAND), A., i, 534.
- action of chlorine on (BIÉTRIX), A., i, 651.
- Gallic acid, dibromo-, action of chlorine on (BIÉTRIX), A., i, 651.
- diechloro- (BIÉTRIX), A., i, 651.
- Gallium and indium in blende from New South Wales (KIRKLAND), A., ii, 183.
- Gallotannic acid, aluminium salt of (GEORGES), A., ii, 451.
- Gall-stones, lithofellic acid from (JÜNGER and KLAGES), A., i, 194.
- Garlic, inulin of (CHEVASTELON), A., i, 5.
- Garnet from Colorado (EAKINS), A., ii, 39.
- from Moravia, alteration of (BARVIŘ), A., ii, 312.
- group (WEINSCHENK), A., ii, 312.
- See also Almandine; Andradite; Essonite; Grossular; Spessartite.
- Gas analysis, compensatory eudiometer (VON THAN), A., ii, 621.
- Gas burette, modification of (BLEIER), A., ii, 70, 271, 573.
- Bunsen's, modification of (SCHATERNIKOFF and SETSCHENOFF), A., ii, 332.
- Gas, coal-, explosive mixtures of air and (CLOWES), P., 1895, 201.
- estimation of benzene in (NOYES and BLINKS), A., ii, 128.
- estimation of sulphur in (MABERY), A., ii, 387.
- estimation of sulphurous anhydride and sulphuric acid in products of combustion of (DENNSTEDT and AHRENS), A., ii, 217.
- flames, influence of sulphurous anhydride in, on quantitative estimations (MULDER), A., ii, 333.
- Gas pipette (BLEIER), A., ii, 70, 271; (LIDOFF), A., ii, 385.

- Gases, effect of electric sparks on (HOFMANN LECTURE), T., 727.
 electric discharge through (LEHMANN), A., ii, 143.
 connection between the dielectric constant and the valency of (LANG), A., ii, 144.
 determination of the density of (MOISSAN and GAUTIER), A., ii, 294.
 liquefaction of (DEWAR), P., 1895, 221; (LINDE), A., ii, 232.
 solubility of solids in (ARCTOWSKI), A., ii, 635.
 endothermic, explosion of (MAQUENNE), A., ii, 87.
 combination of, in equal volumes (DIXON), T., 780; P., 1896, 56.
 filling vacuum tubes with (YOUNG and DARLING), A., ii, 3.
 given off in fermentative changes in natural and polluted waters, analysis of (ADENEY), A., ii, 323.
 in human stomach (WISSEL), A., ii, 196.
- Gastric digestion. See Digestion.
- Gastric juice, causes of secretion of acid of (KOEPE), A., ii, 376.
 estimation of hydrochloric acid in (SJÖQUIST), A., ii, 496; (MORACZEWSKI), A., ii, 671.
- Gaultherase, the ferment which hydrolyses gaultherin (BOURQUELOT), A., ii, 540.
 solubility of, in alcohol (DASTRE), A., i, 398.
- Gaultheria procumbens*, existence of gaultherase in (BOURQUELOT), A., ii, 540.
- Gaultherin, identity of the glucoside of *Monotropa hypopithys* with (BOURQUELOT), A., ii, 540.
- Gedinite, difference between succinite and (HELM), A., i, 57.
 non-occurrence of free succinic acid in (HELM), A., i, 57.
- Gehlenite in slags (HEBERDEY), A., ii, 371.
- Gelatin, liquefaction of (DASTRE and FLORESCO), A., i, 196.
 estimation of, in meat extracts (BÖMER), A., ii, 83; (STUTZER), A., ii, 84.
- Gelatose, conversion of gelatin into (DASTRE and FLORESCO), A., i, 196.
- Gelose, estimation of, in syrups, &c. (PY), A., ii, 342.
- Gelseminine and its salts (GÖLDNER), A., i, 657.
- Genista racemosus*, occurrence of cytisine in, and other plants of the same natural order (PLUGGE), A., ii, 61.
- Gentisic acid, physiological action of (LIKHATSCHIEFF), A., ii, 492.
- Gentisin, synthesis of (KOSTANECKI and TAMBOR), A., i, 369.
 non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.
- Geranaldehyde, constitution of (BARBIER and BOUVEAULT), A., i, 445.
- Geranic acid, ethylic salt, from methylheptenone (BARBIER and BOUVEAULT), A., i, 445.
- Geraniol from oil of pelargonium (BARBIER and BOUVEAULT), A., i, 446.
 occurrence of, in essential oils (BERTRAM and GILDEMEISTER), A., i, 381.
 behaviour of, towards formic acid (BERTRAM and GILDEMEISTER), A., i, 382.
 oxidation of (BARBIER and BOUVEAULT), A., i, 345.
 action of dibasic acids on (ERDMANN and HUTH), A., i, 198.
 compound of, with camphoric acid (ERDMANN and HUTH), A., i, 198.
- Geranium (*pelargonium*) oil (BARBIER and BOUVEAULT), A., i, 446.
 Indian, French, African, and Réunion, composition of (BERTRAM and GILDEMEISTER), A., i, 381.
 Spanish, African, and Réunion, composition of (TIEMANN and SCHMIDT), A., i, 384.
- Gersdorffite from the Harz (KLOCKMANN), A., ii, 307.
 from Ontario (HOFFMANN), A., ii, 191.
 from Sardinia (LOVISATO), A., ii, 183.
- Gibbsite, artificial (SCHULTEN), A., ii, 610.
- Gland peptone. See Peptones.
- Glass, spherulites in (HYNDMAN and BONNEY), A., ii, 614.
 action of magnesia solution on (KONINCK), A., ii, 480.
 action of water on (SPEZIA), A., ii, 257.
- Glaucinite from Co. Antrim (HOSKINS), A., ii, 434.
 from Russia (ZEMJATSCHENSKY), A., ii, 568.
- Glaucophane from Burma (BAUER), A., ii, 311.
 from Piedmont (COLOMBA), A., ii, 569.
- Gliadin (OSBORNE), A., i, 400.
- Globulin, presence of, in diastase (OSBORNE), A., i, 399.

- Globulin from malt (OSBORNE and CAMPBELL), A., i, 714.
 in peas and vetches (OSBORNE and CAMPBELL), A., i, 715.
 (*tuberin*) in the potato (OSBORNE and CAMPBELL), A., i, 715.
 Glockerite from Colorado (PEARCE), A., ii, 613.
 Glucose, yeast (BAU), A., i, 453.
 Glucic acid (WINTER), A., i, 11, 12.
apo-Glucic acid (WINTER), A., i, 12.
 Glucoheptitol, compound of, with acetone (SPEIER), A., i, 77.
 α -Glucoheptonic acid, velocity of lactone formation of (HJELT), A., i, 597.
 Gluconic acid, calcium salt, action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
 Glucosamine hydrochloride, oxime of (WINTERSTEIN), A., i, 520.
d-Glucose (*dextrose*), identity of, from different sources (O'SULLIVAN and STERN), T., 1691; P., 1896, 218.
 synthesis of (HOFMANN LECTURE), T., 707.
 formation of, from cocoa-nut shells (DE HAAS and TOLLENS), A., ii, 64.
 formation of, from cellulose by hydrolysis (WINTERSTEIN), A., ii, 210.
 relative proportion of, to levulose in sweet wines ((KÖNIG), A., ii, 79.
 specific rotatory power of, from different sources (O'SULLIVAN and STERN), T., 1695; P., 1896, 218.
 birotation of, in various solvents (TREY), A., ii, 139.
 freezing points of dilute solutions of (ABEGG), A., ii, 588.
 specific gravity of aqueous solutions of, from different sources (O'SULLIVAN and STERN), T., 1693; P., 1896, 218.
 cupric reducing power of, from different sources (O'SULLIVAN and STERN), T., 1696; P., 1896, 218.
 transformation of, into fructose and mannose (DE BRUYN and VAN EKENSTEIN), A., i, 116.
 conversion of, into mannitol by fermentation (BASILE), A., ii, 121.
 action of dilute alkalis on (DE BRUYN), A., i, 116.
 action of lead hydroxide on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
 action of lead hydroxide and potash on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
 action of chloral hydrate on (MEUNIER), A., i, 334.
 action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
d-Glucose (*dextrose*), action of glyoxylic acid on (BOETTINGER), A., i, 5.
 action of oxalic acid on (KIERMAYER), A., i, 145.
 condensation product of, with acetone (FISCHER), A., i, 4.
 methylene derivative (HENNEBERG and TOLLENS), A., i, 645.
 reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 145; P., 1896, 9.
 estimation of (OPPERMANN), A., ii, 278; (CAUSSE), A., ii, 582.
 estimation of, by Fehling's solution (HEFELMANN), A., ii, 505; (KJELDAHL), A., ii, 581.
 extent of action of, on alkaline copper solutions (KJELDAHL), A., ii, 453.
 estimation of, by copper potassium carbonate (OST), A., ii, 453.
 estimation of, by cyanocupric solution (GERRARD), A., ii, 225.
 estimation of, in jams, &c. (MAYRHOFER), A., ii, 225.
 estimation of, in syrups, &c. (PY), A., ii, 342.
 estimation of, in urine (LOHNSTEIN), A., ii, 128.
 estimation of small quantities of, in urine (BUCHNER), A., ii, 225.
 Glucose-acetone (FISCHER), A., i, 4.
 Glucose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
 Glucose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
 Glucose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
 Glucosebenzylmercaptal (LAWRENCE), A., i, 272.
 Glucose-ethylenemercaptal and action of bromine on (LAWRENCE), A., i, 272.
 Glucose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
 Glucosenaphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
 Glucosetrimethylenemercaptal (LAWRENCE), A., i, 272.
 Glucoside, $C_{30}H_{48}O_{13}$, from *Acokanthera schimperi* (FRASER and TILLIE), A., i, 386.
 Glucosides, existence of colouring matters as (PERKIN and HUMMEL), T., 1572; P., 1896, 186.
 action of animal secretions on (FISCHER and NIEBEL), A., ii, 665.
 detection of (FORMÁNEK), A., ii, 401.
 Glucosides. See also:—
 Amygdalin; Cuscutin; Digitalis glucosides; Digitalin; Digitalein; Digitonin; Gaultherin; Jalapin;

- Salicin ; Scammonin ; Turpethin ; Vicin.
- Glue, action of alcoholic hydrogen chloride and sodium nitrite on (CURTIUS), A., i, 337.
- Glutamine, occurrence of, in plants (SCHULZE), A., ii, 572.
- Glutamine group, presence of, in gluten, casein, and vegetable fibrin (FLEURENT), A., i, 112.
- Glutaric acids, asymmetrie, anils and anilie acids of, general survey of (AUWERS), A., i, 641.
- substituted, relative volatility of (AUWERS and SCHLOSSER), A., i, 639.
- Glutaric anhydride, reduction products of (FICHTER and HERBRAND), A., i, 463.
- Glutarimide, velocity of decomposition by hydrochloric acid of (MIOLATI), A., ii, 242.
- Gluten, constitution and hydrolysis of (FLEURENT), A., i, 112.
- Glutin-peptone, action of nitrous acid on (PAAL), A., i, 455.
- Glutin-peptones (PAAL), A., i, 632.
- Glyceric acid, preparation of (CAZENEUVE), A., i, 596.
- Glyceric- β -naphthalide, benzoyl derivative of (GASSMANN), A., i, 488.
- Glycerol, electrolytic conductivity of salts dissolved in (CATTANEO), A., ii, 231.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- action of chlorine on, in presence of iodine (ZAHARIA), A., i, 644.
- action of silver chloride and sodium hydroxide on (CAZENEUVE), A., i, 596.
- effect of, on germination of plants (PRIANISCHNIKOFF), ii, A., 380.
- influence of, in nutrition of plants (KINOSHITA), A., ii, 54.
- nitrate, observations on the boiling point of (DE BRUYN), A., i, 115.
- estimation of, for dynamite manufacture (LEWKOWITSCH, A., ii, 452.
- estimation of, in wine and beer (LABORDE), A., ii, 77 ; (PARTHIEL), A., ii, 78.
- estimation of arsenic in (BARTON), A., ii, 499.
- Glycerose, preparation of (FONZES-DIAON), A., 459.
- Glycocholic acid, crystalline, preparation of, from ox-bile (RICHTER), A., i, 111.
- Glycocine (*aminoacetic acid*), constitution of (SAKURAI), P., 1896, 38.
- Glycocine (*aminoacetic acid*), action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- condensation of, with benzaldehyde (ERLENMEYER), A., i, 305.
- Glyeogen, preparation of, free from albumoses (HUIZINGA), A., i, 6.
- presence of, in lymph (DASTRE), A., ii, 119.
- formation of, in the living body (KAUFMANN and DASTRE), A., ii, 119.
- formation of, from fat in the silkworm (COUVREUR), A., ii, 317.
- as a source of muscular energy (SCHENCK), A., ii, 48 ; (SEEGER), A., ii, 487.
- action of blood-serum on (BOURQUELOT and GLEY), A., ii, 119.
- estimation of, in liver and muscle (KISTIAKOFFSKY), A., ii, 80.
- Glycogenesis in the liver (Mosse), A., ii, 617.
- Glycol, preparation of (HAWORTH and PERKIN), T., 175 ; P., 1896, 37.
- chlorhydrin, action of sodium ethoxide and phenol on (BENTLEY, HAWORTH, and PERKIN), T., 164.
- monophenyl ether (BENTLEY, HAWORTH, and PERKIN), T., 164.
- Glycol, $C_5H_{12}O_2$, from action of potash on a mixture of isobutaldehyde and formaldehyde, oxidation of (JUST), A., i, 403, 404.
- Glycol, $C_{10}H_{18}O_2$, from trihydroxymenthane, and its diacetate (GINZBERG), A., i, 447.
- Glycolhydraerylic acid, thio- (*acetic β -thiopropionic acid*) (LOVÉN), A., i, 412.
- Glycollic acid, compounds of, with anisidine (BOETTINGER), A., i, 411.
- sodium salt, electrolysis of (WALKER), T., 1278.
- o*- and *p*-anisidine salts of (BOETTINGER), A., i, 411.
- ethylic salt of, preparation of (WISLICENUS), A., i, 672.
- p*-phenetidine salts of (BOETTINGER), A., i, 411.
- Glycollic-*o*-anisidide (BOETTINGER), A., i, 411.
- Glycollic-*p*-anisidide (BOETTINGER), A., i, 411.
- Glycollic- α -naphthalide (BOETTINGER), A., i, 443.
- benzoyl derivative (GASSMANN), A., i, 487.
- Glycollic- β -naphthalide, benzoyl derivative (GASSMANN), A., i, 487.
- Glycollic-*p*-phenetidide (BOETTINGER), A., i, 411.

- Glycols from action of potash on aldehydes, constitution of (LIEBEN), A., i, 403.
- Glycolylazoinide and the urethane (CURTIUS), A., i, 35.
- Glycolysis (NASSE and FRAMM), A., i, 398.
- Glycosuria from phloridzin, causes of (ZUNTZ), A., ii, 666.
- Glycuronic acid (MANN and TOLLENS), A., i, 417.
- Glycuronic acids, conjugated, in urine (DAIBER), A., ii, 491.
- Glyoxal, Ljubawin's method for preparing, improvements in (SPIEGEL), A., i, 346.
- action of hydroxylamine hydrochloride on (MIOLATI), A., i, 276.
- Glyoxylic acid (*glyoxalic acid*) (CURTIUS), A., i, 338.
- action of sodium ethoxide on (BOETTINGER), A., i, 411.
- hydrolysing action of, on carbohydrates (BOETTINGER), A., i, 5, 6.
- condensation of, with aminobenzoic acids (BOETTINGER), A., i, 47.
- ethylic salt, hydrazone of (VON PECHMANN), A., i, 678.
- Glyoxylic acid, chloro-, ethylic salt of, action of, on hydrocarbons (BOUVEAULT), A., i, 551.
- Gold, native, from Bohemia (STOLBA), A., ii, 429.
- native, from Servia (LOSANITSCH), A., ii, 252.
- in the Cripple Creek ores (PEARCE), A., ii, 612, 613.
- extraction of, by the cyanide process (GOYDER), A., ii, 28.
- chemistry of the cyanide process for dissolving (GOYDER), A., ii, 565.
- melting point of (HOLBORN and WIEN, LE CHATELIER), A., ii, 87.
- rate of diffusion of, through lead, bismuth, tin, and mercury (ROBERTS-AUSTEN), A., ii, 592.
- diffusion of, through solid lead and silver (ROBERTS-AUSTEN), A., ii, 593.
- Gold-alloys with silver, solubility of, in potassium cyanide solutions (MACLAURIN), T., 1276; P., 1896, 149.
- Gold chloride, action of magnesium on solutions of (VITALI), A., ii, 420.
- double sulphides of silver, lead, iron, copper, and (MACLAURIN), T., 1269; P., 1896, 149.
- Gold, estimation of, in copper and copper matte (SMITH), A., ii, 76.
- separation of, from silver by volatilisation (RICHARDS), A., ii, 674.
- Gold, separation, electrolytically, of, from cobalt, arsenic, copper, zinc, and nickel (SMITH and WALLACE), A., ii, 220.
- Gorgonia carolinii*, presence of iodine in skeleton of (DRECHSEL), A., ii, 378.
- Gorgonic acid, iodo- (DRECHSEL), A., ii, 378.
- Gorgonin, constitution of (DRECHSEL), A., ii, 378.
- Gout, precipitation of urates in attacks of (MORDHORST), A., ii, 491.
- Grain, proteids of (RITTHAUSEN), A., i, 716.
- Gramineæ*, pentoses in (GOETZE and PFEIFFER), A., ii, 443.
- Granatal. See Dihydrogranatone.
- Granatanine, oxidation of (CIAMICIAN and SILBER), A., i, 397.
- Granatenine (CIAMICIAN and SILBER), A., i, 397.
- Granatic acid (*homotropinic acid*) and its aurochloride (CIAMICIAN and SILBER), A., i, 397.
- Granatoline (CIAMICIAN and SILBER), A., i, 397.
- Granatonine (CIAMICIAN and SILBER), A., i, 397.
- analogy of, with tropinone (WILLSTÄTTER), A., i, 328.
- Granite from district of Columbia, disintegration of (MERRILL), A., ii, 483.
- from Jersey, alteration of (HOLLAND and DICKSON), A., ii, 261.
- from Odenwald (CHELIUS), A., ii, 612.
- gases from (TILDEN), A., ii, 656.
- Granites, silica and quartz of (ZALESKI), A., ii, 262.
- Grapes, blue, colouring matter in (WEIGERT), A., i, 388.
- red, colouring matter in (SOSTEGNI), A., ii, 122.
- Graphite. See under Carbon.
- Graphitic schist from co. Donegal (Moss), A., ii, 108.
- Graphitoid from Saxony (LUZI), A., ii, 366.
- Grossular from California (CLARKE), A., ii, 38.
- from Quebec (HOFFMANN), A., ii, 257.
- Guaiacol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1135, 1188, 1240.
- etheral salts of, extraction and detection of (DRAGENDORFF), A., ii, 278.
- carbonate, action of alcohol and ammonia on (CAZENEUVE), A., i, 528.

- Guaiacol, carbonate, action of aniline and of *o*- and *p*-toluidine on (CAZENEUVE), A., i, 528.
 phosphate (DUBOIS), A., i, 152.
 succinate (DUBOIS), A., i, 152.
 Guaiacol, tetrachloro- (BRÜGGEMANN), A., i, 356.
p-nitro- [OH : OMe : NO₂ = 1 : 2 : 4] (MELDOLA), P., 1896, 125—127.
 dinitro- [OH : OMe : (NO₂)₂ = 1 : 2 : 4 : 6] (MELDOLA, WOOLCOTT, and WRAY), T., 1331.
 nitramino- [OH : OMe : NO₂ : NH₂ = 1 : 2 : 4 : 6], and its acetyl derivatives (MELDOLA, WOOLCOTT, and WRAY), T., 1331; P., 1896, 164.
 thio- (VOSWINKEL), A., i, 378.
 detection of (DRAGENDORFF), A., ii, 279.
 Guaiacolantipyrine (PATEIN and DUFAY), A., i, 188.
 Guanidine, occurrence of, in *Vicia sativa* (SCHULZE), A., ii, 208.
 preparation of (HOFMANN LECTURE), T., 715.
 compounds of, with the sugars (WOLFF), A., i, 78, 79.
 Guanidine, amino-, hydrolysis of (CURTIUS), A., i, 338.
 nitro-, reduction of (CURTIUS), A., i, 338.
 Guarinite from Vesuvius (REBUFFAT), A., ii, 309.
 L-Gulonic acid, velocity of lactone formation of (HJELT), A., i, 597.
 Gum, wood. See Xylan.
 Gurjun balsam, detection of (HIRSCHSOHN), A., ii, 508.
 Gypsum, artificial (GORGET), A., ii, 35.
 from Utah (MOSES), A., ii, 661.
 from Sicily, water enclosed in (SJÖGREN), A., ii, 110.

H.

- Hæmacytometer, description of a new (OLIVER), A., ii, 437.
 Hæmatic acid, dibasic and tribasic (KÜSTER), A., i, 516.
 Hæmatin, and its salts (KÜSTER), A., i, 516.
 absorption spectrum of, and its compounds (GAMGEE), A., i, 713.
 absorption of, from the alimentary canal (TIRMANN), A., ii, 487.
 Hæmatite from Elba (ROHREB), A., ii, 431.
 artificial (MÜLLER), A., ii, 254; (ARC-TOWSKI), A., ii, 307.

- Hæmatite, magnetic behaviour of (ABT), A., ii, 656.
Hæmatomma coccineum, occurrence of atranoric and hæmatommic acids and allied compounds in (ZOPF), A., i, 103.
ventosum, absence of atranoric acid in (ZOPF), A., i, 103.
 Hæmatommenic acid, preparation and properties of (ZOPF), A., i, 104.
 Hæmatommic acid, preparation and properties of (ZOPF), A., i, 103.
 Hæmatoporphyrin (SCHÜNCK and MARCHLEWSKI), A., i, 496, 574.
 identity of, with turacoporphyrin (GAMGEE), A., i, 714.
 absorption bands of (TSCHIRCH), A., i, 624.
 absorption spectra of acid and alkaline solutions of (GAMGEE), A., i, 714.
 sources of, in urine (STOKVIS), A., ii, 537.
 Hæmatoporphyrinuria caused by doses of sulphonal (GARROD and HOPKINS), A., ii, 264.
 Hæmatoxylin, behaviour of, towards fused potash (HERZIG), A., i, 379.
 trimethylic ether. See Trimethyl-hæmatoxylin.
 Hæmin (KÜSTER), A., i, 516.
 hydrochloride, preparation and composition of (CLOETTA), A., i, 660.
 Hæmochromogen, absorption spectrum of (GAMGEE), A., i, 713.
 Hæmogallol, absorption of, from the alimentary canal (GEORGENBURGER), A., ii, 485; (TIRMANN), A., ii, 487.
 Hæmoglobin, formation of, from inorganic iron (KUNKEL), A., ii, 47.
 action of acetylene on (BROCINER), A., ii, 264.
 absorption of, in alimentary canal (GEORGENBURGER), A., ii, 485; (TIRMANN), A., ii, 487.
 estimation of, by a colorimeter (ZANGEMEISTER), A., ii, 404.
 Methæmoglobin, absorption spectrum of (GAMGEE), A., i, 713.
 in blood and urine from chlorate poisoning (BRANDENBURG), A., ii, 491.
 Carboxyhæmoglobin, spectroscopic examination of (GAMGEE), A., i, 713.
 dissociation constant of (HÜFNER), A., ii, 485.
 Hæmoglobinometer, description of a new (OLIVER), A., ii, 437.
 Hæmol, absorption of, in the alimentary canal (GEORGENBURGER), A., ii, 485.
 Hainite from Bohemia (BLUMRICH), A., ii, 314.

- Halogens, free, poisonous effect of, on
algæ and infusoria (BOKORNY), A.,
ii, 669.
- Halogen compounds, poisonous effect of,
on algæ and infusoria (BOKORNY), A.,
ii, 669.
- Haricots. See Agricultural chemistry.
(Appendix.)
- Harmaline, constitution of (HERZIG and
MEYER), A., i, 68.
- Harmine, constitution of (HERZIG and
MEYER), A., i, 68.
- Harmotome from Ontario (HOFFMANN),
A., ii, 190.
- dehydration of; absorption of am-
monia by (FRIEDEL), A., ii, 481.
- Hastingsite from Ontario (ADAMS and
HARRINGTON), A., ii, 374.
- Hautefeuilleite from Balme, Norway
(MICHEL), A., ii, 112.
- Hawthorn blossom, colouring matter of
white (PERKIN and HUMMEL), T.,
1570; P., 1896, 186.
- Hay. See Agricultural chemistry. (Ap-
pendix.)
- Heart, embryonic, physiology of the
(PICKERING), A., ii, 663.
- action of drugs on (PICKERING),
A., ii, 46.
- frog's, nutrition of (WHITE), A., ii,
437.
- HEAT :—
- Absorption of radiant heat by liquids
(ZSIGMONDY), A., ii, 464.
- Boiling point or points, apparatus for
the accurate determination of
(KAHLBAUM), A., ii, 233.
- apparatus for determining (PER-
KIN), T., 1041; P., 1896, 122.
- in a high vacuum (KRAFFT and
WEILANDT), A., ii, 464.
- and the genesis of the elements
(BLANSHARD), A., ii, 233.
- mathematical treatment of eleva-
tion of (VAN LAAR), A., ii, 154.
- determination of molecular weights
by the elevation of (BECKMANN,
FUCHS, and GERNHARDT), A., ii,
237.
- of organic substances (PERKIN), T.,
1247.
- in the cathode light vacuum
(KRAFFT and WEILANDT), A.,
ii, 635.
- of aqueous solutions of arsenic tri-
oxide (BILZ), A., ii, 152.
- of a solution of arsenic trioxide in
nitrobenzene (BILZ), A., ii, 152.
- of solutions of α -nitrocamphor in
alcohol (PESCIETTA), A., ii, 346.
- of carbon (VIOLE), A., ii, 8.

HEAT :—

- Boiling point or points of solutions
of hexadecylamine hydrochloride
(KRAFFT and STRUTZ), A., ii,
467.
- of hydrogen (OLSZEWSKI), A., ii, 9.
- of solutions in methylic and
ethylic alcohol (WOELFER), A.,
ii, 237.
- of alcoholic solutions of sodium
oleate (KRAFFT and STRUTZ),
A., ii, 467.
- of zinc (LE CHATELIER), A., ii, 87.
- Heat of bromination of oils, deter-
mination of (WILEY), A., ii, 543.
- Calorie, uncertainty in the value of
the (GRIFFITHS), A., ii, 147.
- Calorimeter, mixing, improved
(WATERMAN), A., ii, 146.
- modification of Regnault's thermo-
(MASSOL and GUILLOT), A., ii, 8.
- Heat of combustion of fuels, deter-
mination of the (HEMPEL), A., ii,
556.
- See also Heat, Thermochemical data
- Conductivity of vapours for heat and
ion velocity, connection between
(BREDIG), A., ii, 348.
- Critical temperature, disappearance of
the meniscus at the (ZAMBIASI),
A., ii, 234; (ALTSCHUL), A., ii,
407.
- specific volumes of the liquid and
gaseous phases at the
(ZAMBIASI), A., ii, 234.
- of mixtures (KUENEN), A., ii, 10.
- of ethylic alcohol (BATELLI), A.,
ii, 150.
- of hydrogen (OLSZEWSKI), A., ii, 9.
- Heat developed by alcoholic fer-
mentation (BOUFFARD), A., ii, 12.
- by the nitration of aromatic sub-
stances (MATIGNON and
DELIGNY), A., ii, 88.
- Heat of dilution and freezing point,
relation between (ROLOFF), A.,
ii, 291.
- Dissociation pressure of hydrated
barium chloride (MÜLLER-
ERZBACH), A., ii, 295.
- of hydrated copper sulphate
(MÜLLER-ERZBACH), A., ii, 295.
- of hydrated disodium hydrogen
phosphate (MÜLLER-ERZBACH),
A., ii, 295.
- of hydrated zinc sulphate (MÜLLER-
ERZBACH), A., ii, 295.
- Heat of electrolytic dissociation of
acetic acid (KORTRIGHT), A.,
ii, 463.
- of bromacetic acid (KORTRIGHT),
A., ii, 463.

HEAT:—

- Heat of electrolytic dissociation of
 - chloracetic acid (KORTRIGHT), A., ii, 463.
 - of dichloracetic acid (KORTRIGHT), A., ii, 463.
 - of benzoic acid (KORTRIGHT), A., ii, 463.
 - of butyric acid (KORTRIGHT), A., ii, 463.
 - of citraconic acid (KORTRIGHT), A., ii, 463.
 - of fumaric acid (KORTRIGHT), A., ii, 463.
 - of maleic acid (KORTRIGHT), A., ii, 463.
 - of malonic acid (KORTRIGHT), A., ii, 463.
 - of mesaconic acid (KORTRIGHT), A., ii, 463.
 - of phthalic acid (KORTRIGHT), A., ii, 463.
 - of isophthalic acid (KORTRIGHT), A., ii, 463.
 - of succinic acid (KORTRIGHT), A., ii, 463.
- Expansion coefficient of argon and helium (KUENEN and RANDALL), A., ii, 598.
- of liquids (TRAUBE), A., ii, 235.
- of salt solutions (DE LANNOY), A., ii, 233.
- Heat of formation. See Heat, thermochemical data.
- Freezing point or points, abnormal depressions of the (GARELLI), A., ii, 292.
- connection between constitution and abnormal depression of the (GARELLI), A., ii, 157.
- of solutions, apparent and true (WILDERMANN), A., ii, 290.
- depression, mathematical treatment of (VAN LAAR), A., ii, 154.
- in pure ice from dilute solutions (ZOPPELLARI), A., ii, 514.
- depression of, of milk and serum (WINTER), A., ii, 199.
- formation of solid solutions causing abnormal depressions of the (GARELLI), A., ii, 469.
- molecular depression in aqueous solutions of the (WILDERMANN), A., ii, 351.
- of concentrated solutions, method of determining the (ROLOFF), A., ii, 291.
- of dilute solutions, determination of (NERNST and ABEGG), A., ii, 292, 352; (LOOMIS), A., ii, 353; (WILDERMANN; ABEGG), A., ii, 587; (PONSOT), A., ii, 636.

HEAT:—

- Freezing point or points of solutions of substances in solvents of similar constitution (GARELLI), A., ii, 292.
- of solutions of organic compounds in bromoform (AMPOLA and MANUELLI), A., ii, 238.
- of solutions of salts and acids in formic acid (ZANNINOVICH-TESSARIN), A., ii, 352.
- of benzene solutions, influence of pressure on (COLSON), A., ii, 157.
- of aqueous solutions of acetic acid (PONSOT), A., ii, 412.
- of concentrated aqueous solutions of acetic acid (ROLOFF), A., ii, 291.
- of solutions of the acetates of weak bases in benzene (ZOPPELLARI), A., ii, 515.
- of dilute solutions of dichloracetic acid (WILDERMANN), A., ii, 351.
- of dilute solutions of trichloracetic acid (WILDERMANN), A., ii, 351.
- of dilute solutions of ammonium chloride (LOOMIS), A., ii, 352.
- of dilute solutions of ammonium nitrate (LOOMIS), A., ii, 352.
- of aqueous solutions of barium chloride (PONSOT), A., ii, 412.
- of dilute solutions of barium chloride (LOOMIS), A., ii, 352.
- of dilute solutions of *o*-nitrobenzoic acid (WILDERMANN), A., ii, 351.
- of aqueous solutions of calcium chloride (PONSOT), A., ii, 412.
- of solutions of α -nitrocamphor in benzene (PESCETTA), A., ii, 346.
- of dilute solutions of carbamide (ABEGG), A., ii, 588.
- of dilute solutions of ethylic alcohol (JONES), A., ii, 155; (ABEGG), A., ii, 588.
- of solutions of active ethylic diacetylglycerate in acetic acid and in benzene (FRANKLAND and PICKARD), T., 134, 135; P., 1896, 11.
- of dilute solutions of *d*-glucose (ABEGG), A., ii, 588.
- of concentrated aqueous solutions of hydrochloric acid (ROLOFF), A., ii, 291.
- of dilute solutions of hydrochloric acid (LOOMIS), A., ii, 352.
- of aqueous solutions of lead nitrate (PONSOT), A., ii, 412.

HEAT :—

Freezing point or points of dilute solutions of magnesium chloride (LOOMIS), A., ii, 352.

of solutions of active and inactive methylic dibenzoylglycerates in acetic acid, benzene, nitro-benzene, and ethylenic dibromide (FRANKLAND and PICKARD), T., 125, 127, 129, 131, 132; P., 1896, 11.

of aqueous solutions of oxalic acid (PONSOT), A., ii, 412.

of solutions of phenols in corresponding and other hydrocarbons (PATERNO), A., ii, 156.

of solutions of phenols in naphthalene (AUWERS), A., ii, 156.

of solutions of substituted phenols in naphthalene (AUWERS and INNES), A., ii, 293.

of dilute solutions of phosphoric acid (LOOMIS), A., ii, 352.

of aqueous solutions of potassium bromide (PONSOT), A., ii, 412.

of dilute solutions of potassium carbonate (LOOMIS), A., ii, 352.

of aqueous solutions of potassium chloride (PONSOT), A., ii, 412.

of concentrated aqueous solutions of potassium chloride (ROLOFF), A., ii, 291.

of dilute solutions of potassium chloride (WILDERMANN), A., ii, 351; (LOOMIS), A., ii, 352; (ABEGG), A., ii, 588.

of dilute solutions of potassium nitrate (LOOMIS), A., ii, 352.

of aqueous solutions of potassium sulphate (PONSOT), A., ii, 412.

of dilute solutions of potassium sulphate (LOOMIS), A., ii, 352; (ABEGG), A., ii, 588.

of dilute solutions of resorcinol (WILDERMANN), A., ii, 351.

of dilute solutions of sodium carbonate (LOOMIS), A., ii, 352.

of aqueous solutions of sodium chloride (PONSOT), A., ii, 412.

of dilute solutions of sodium nitrate (LOOMIS), A., ii, 352; (ABEGG), A., ii, 588.

of dilute solutions of sodium sulphate (LOOMIS), A., ii, 352.

of aqueous solutions of cane sugar (PONSOT), A., ii, 412.

of dilute solutions of cane sugar (JONES), A., ii, 155; (WILDERMANN), A., ii, 351, 588.

HEAT :—

Freezing point or points of aqueous solutions of sulphuric acid (PONSOT), A., ii, 412.

of dilute solutions of sulphuric acid (WILDERMANN), A., ii, 351.

of dilute solutions of tartaric acid (ABEGG), A., ii, 588.

Heat of ionisation of metals (JAHN), A., ii, 230, 231.

Latent heat or heats of evaporation, method of comparing (MARSHALL and RAMSAY), A., ii, 349.

and molecular complexity, connection of (LINEBARGER), A., ii, 9.

relation of vapour density, boiling point, and (DUDLEY), A., ii, 289.

of elements (SUTHERLAND), A., ii, 7.

of paracetaldehyde (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of acetic acid (MARSHALL and RAMSAY), A., ii, 349.

of acetone (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of isoamylic acetate (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of isoamylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of tertiary amylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of benzene (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (GRIFFITHS and MARSHALL), A., ii, 349.

of camphor (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of carbon bisulphide (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of chloroform (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of cymene (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of decane (LUGININ), A., ii, 146.

of diethyl ketone (LUGININ), A., ii, 146.

of dipropyl ketone (LUGININ), A., ii, 146.

of nitroethane (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

of ethylenic dibromide (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.

HEAT:—

- Latent heat or heats of ethylenic dichloride (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of ethylic acetate (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- of ethylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- of ethylic bromide (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of ethylic carbonate (LOUGUININE), A., ii, 146.
- of ethylic ether (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of ethylic formate (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- of ethylic iodide (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of ethylic propionate (MARSHALL and RAMSAY), A., ii, 349.
- of formic acid (MARSHALL), A., ii, 589.
- of glycerol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of menthol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of menthone (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of methyl butyl ketone (LUGININ), A., ii, 146.
- of methyl ethyl ketone (LUGININ), A., ii, 146.
- of methyl propyl ketone (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of methyl isopropyl ketone (LUGININ), A., ii, 146.
- of methylal (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of methylic acetate (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- of methylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of methylic butyrate (MARSHALL and RAMSAY), A., ii, 349.
- of methylic isobutyrate (MARSHALL and RAMSAY), A., ii, 349.
- of methylic carbonate (LUGININ), A., ii, 146.

HEAT:—

- Latent heat or heats of methylic formate (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237; (MARSHALL and RAMSAY), A., ii, 349.
- of methylic iodide (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of methylic propionate (MARSHALL and RAMSAY), A., ii, 349.
- of normal octane (LUGININ), A., ii, 146.
- of propionitrile (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of propylic acetate (MARSHALL and RAMSAY), A., ii, 349.
- of propylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of isopropylic alcohol (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of propylic formate (MARSHALL and RAMSAY), A., ii, 349.
- of toluene (MARSHALL and RAMSAY), A., ii, 349.
- of water (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- of *m*-xylene (MARSHALL and RAMSAY), A., ii, 349.
- Melting point or points of some metals (LE CHATELIER), A., ii, 87.
- of alloys, influence of isomorphism on the (GAUTIER), A., ii, 646.
- of optical isomerides (WALDEN), A., ii, 553.
- of silver, gold, copper, nickel, palladium, and platinum (HOLBORN and WIEN), A., ii, 87.
- of hydrated sodium sulphate, depression by foreign substances of the (LÖWENHERZ), A., ii, 149.
- physical changes of metallic sulphides at temperatures below their (SPRING), A., ii, 290.
- Heat of bromination of oils, determination of (WILEY), A., ii, 543.
- Heat of solution and dilution, mathematical treatment of (VAN LAAR), A., ii, 154.
- of acenaphthene in methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.
- of solution and dilution of acetamide in water and ethylic alcohol (SPEYERS), A., ii, 411.

HEAT:—

- Heat of solution and dilution of acetanilide in methylic and ethylic alcohols and chloroform (SPEYERS), A., ii, 411.
- of benzamide in ethylic alcohol (SPEYERS), A., ii, 411.
- of chloral hydrate in water, ethylic alcohol, chloroform, and toluene (SPEYERS), A., ii, 411.
- of mannitol in water (SPEYERS), A., ii, 411.
- of naphthalene in methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.
- of phenanthrene in ethylic alcohol and toluene (SPEYERS), A., ii, 411.
- of resorcinol in water and ethylic alcohol (SPEYERS), A., ii, 411.
- of sodium chloride (STACKELBERG), A., ii, 589.
- of succinimide in water and ethylic alcohol (SPEYERS), A., ii, 411.
- curve of sulphuric acid, self-recorded breaks in the (PICKERING), A., ii, 155.
- of cane sugar in water (SPEYERS), A., ii, 411.
- of *p*-toluidine in ethylic alcohol, chloroform, and toluene (SPEYERS), A., ii, 411.
- of urea in water and ethylic alcohol (SPEYERS), A., ii, 411.
- of urethane in water, methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.
- Specific heat of solutions (TAMMANN), A., ii, 289.
- of acetic acid (MASSOL and GUILLOT), A., ii, 8.
- of air (AMAGAT), A., ii, 349.
- of alloys of antimony and iron (LABORDE), A., ii, 652.
- of copper (BARTOLI and STRACCIATI), A., ii, 145.
- of formic acid (MASSOL and GUILLOT), A., ii, 8.
- of graphite (VIOLE), A., ii, 8.
- of lead (BARTOLI and STRACCIATI), A., ii, 145.
- of mercury (BARTOLI and STRACCIATI), A., ii, 145.
- of platinum (BARTOLI and STRACCIATI), A., ii, 145.
- of silver (BARTOLI and STRACCIATI), A., ii, 145.
- of tin (BARTOLI and STRACCIATI), A., ii, 145.

HEAT:—

- Specific heat of water at different temperatures (DIETERICI), A., ii, 232.
- Temperature of certain flames (HARTLEY), T., 844; P., 1896, 98.
- of hydrocarbon flames (LEWES), A., ii, 141.
- influence of, on the rate of chemical change (HARCOURT and ESSON), A., ii, 238.
- influence of, on the velocity of intramolecular changes of oximes of (LEY), A., ii, 243.
- of maximum density of salt solutions (DE LANNON), A., ii, 233.
- Temperatures, measurement of high (HOLBORN and WIEN), A., ii, 87.
- low (DEWAR), P., 1895, 221.
- production of very low (LINDE), A., ii, 232.
- Thermochemical data of acetal and chloroacetal (RIVALS), A., ii, 588.
- of *p*-nitroacetanilide (MATIGNON and DELIGNY), A., ii, 88.
- of acetylacetone (GUINCHANT), A., ii, 12.
- of ammonium mercuric bromocyanide (VARET), A., ii, 88.
- of ammonium mercuric iodo cyanide (VARET), A., ii, 148.
- of barium mercuric bromocyanide (VARET), A., ii, 88.
- of barium mercuric iodo cyanide (VARET), A., ii, 148.
- of barium oxybromide (TASSILLY), A., ii, 465.
- of barium oxychloride (TASSILLY), A., ii, 465.
- of nitrobenzaldehyde (MATIGNON and DELIGNY), A., ii, 88.
- of *o*-chlorobenzoic acid (RIVALS), A., ii, 409.
- of *o*-chlorobenzoic chloride (RIVALS), A., ii, 409.
- of *m*- and *p*-nitrobenzoic acids (MATIGNON and DELIGNY), A., ii, 88.
- of benzoic cyanide (GUINCHANT), A., ii, 465.
- of benzoylalanine (STOHMANN and SCHMIDT), A., ii, 466.
- of benzoylsarcosine (STOHMANN and SCHMIDT), A., ii, 466.
- of cadmium mercuric bromocyanide (VARET), A., ii, 88.
- of cadmium mercuric iodo cyanide (VARET), A., ii, 148.
- of hydrated calcium iodide (TASSILLY), A., ii, 350.

HEAT:—

- Thermochemical data of calcium mercuric bromocyanide (VARET), A., ii, 88.
- of calcium mercuric iodocyanide (VARET), A., ii, 148.
- of calcium oxybromide (TASSILLY), A., ii, 465.
- of nitrocarbamide (TANATAR), A., ii, 466.
- of cuprous cyanide (VARET), A., ii, 149.
- of cyanacetamide (GUINCHANT), A., ii, 465.
- of cyanacetic acid (GUINCHANT), A., ii, 465.
- of cyanacetophenone (GUINCHANT), A., ii, 465.
- of cyanuric acid (LEMOULT), A., ii, 11.
- of the ethylic salts of the chloracetic acids (RIVALS), A., ii, 588.
- of ethylic cyanacetate (GUINCHANT), A., ii, 12.
- of ethylic cyanacetoacetate (GUINCHANT), A., ii, 12.
- of ethylic diacetoacetate (GUINCHANT), A., ii, 12.
- of hippuric acid (STOHMANN and SCHMIDT), A., ii, 466.
- of hydrogen selenide (PELABON), A., ii, 96.
- of lithium cyanide (VARET), A., ii, 149.
- of lithium mercuric bromocyanide (VARET), A., ii, 88.
- of lithium mercuric iodocyanide (VARET), A., ii, 148.
- of magnesium cyanide (VARET), A., ii, 149.
- of magnesium mercuric bromocyanide (VARET), A., ii, 88.
- of magnesium mercuric iodocyanide (VARET), A., ii, 148.
- of manganese carbide (LE CHATELIER), A., ii, 350.
- of manganese carbonate (LE CHATELIER), A., ii, 350.
- of manganese monoxide (LE CHATELIER), A., ii, 350.
- of manganese peroxide (LE CHATELIER), A., ii, 350.
- of manganese silicate (LE CHATELIER), A., ii, 350.
- of methylic acetoacetate (GUINCHANT), A., ii, 12.
- of methylic acetylmalonate (GUINCHANT), A., ii, 12.
- of methylic cyanacetate (GUINCHANT), A., ii, 12.
- of methylic cyanacetoacetate (GUINCHANT), A., ii, 12.

HEAT:—

- Thermochemical data of methylic malonate (GUINCHANT), A., ii, 12.
- of nickel cyanide (VARET), A., ii, 513.
- of some nickelocyanides (VARET), A., ii, 513.
- of phenylacetic acid (STOHMANN and SCHMIDT), A., ii, 466.
- of phenaceturic acid (STOHMANN and SCHMIDT), A., ii, 466.
- of *o*-nitrophenol (MATIGNON and DELIGNY), A., ii, 88.
- of *p*-nitrophenol (MATIGNON and DELIGNY), A., ii, 88.
- of potassium *o*-chlorobenzoate (RIVALS), A., ii, 409.
- of sodium and potassium cyanurates (LEMOULT), A., ii, 11.
- of sodium mercuric bromocyanide (VARET), A., ii, 88.
- of sodium mercuric iodocyanide (VARET), A., ii, 148.
- of strontium mercuric bromocyanide (VARET), A., ii, 88.
- of hydrated strontium iodide (TASSILLY), A., ii, 350.
- of strontium mercuric iodocyanide (VARET), A., ii, 148.
- of strontium oxybromide (TASSILLY), A., ii, 465.
- of *o*-toluoylalanine (STOHMANN and SCHMIDT), A., ii, 466.
- of *p*-toluoylalanine (STOHMANN and SCHMIDT), A., ii, 466.
- of *o*-, *m*-, and *p*-toluric acids (STOHMANN and SCHMIDT), A., ii, 466.
- of triethylic phosphate (CAVALIER), A., ii, 590.
- of zinc mercuric bromocyanide (VARET), A., ii, 88.
- relating to the combination of benzene and azobenzene in the liquid and solid states (PICKERING), A., ii, 148.
- relating to the combination of dinitrobenzenes and naphthalene in the liquid and solid states (PICKERING), A., ii, 148.
- relating to the replacement of mercury by potassium (VARET), A., ii, 649.
- relating to the combination of pinacone and water in the liquid and solid states (PICKERING), A., ii, 148.
- relating to the combination of sodium hydroxide and water in the liquid and solid states (PICKERING), A., ii, 148.

HEAT:—

- Thermochemical data relating to the combination of stannic bromide and water in the liquid and solid states (PICKERING), A., ii, 148.
- relating to the combination of sulphuric acid and water in the liquid and solid states (PICKERING), A., ii, 148.
- of uranium compounds (ALOY), A., ii, 590.
- Thermochemistry, fundamental atomic laws of (SUTHERLAND), A., ii, 7.
- Thermo-couple, Le Chatelier's, comparison of the air thermometer with (HOLBORN and WIEN), A., ii, 87.
- Thermodynamics, applications to chemistry of (FITZGERALD), T., 895; P., 1896, 25.
- of galvanic polarisation (LE BLANC), A., ii, 4.
- Thermoelectromotive force of metals and alloys (DEWAR and FLEMING), A., ii, 4.
- Thermometry, advantages of the use of argon in (QUINAN), A., ii, 407.
- Transition point of hydrated sodium hydrogen phosphate (BAUR), A., ii, 146.
- Unit of heat, proposal of a standard (GRIFFITHS), A., ii, 147.
- Vapour pressures at high temperatures, apparatus for determining (WALTER), A., ii, 297.
- of mixtures of volatile liquids (LINEBARGER), A., ii, 408.
- of concentrated solutions of calcium nitrate (WADDELL), A., ii, 151.
- of ethylic alcohol (BATELLI), A., ii, 150.
- of concentrated solutions of lithium nitrate (WADDELL), A., ii, 151.
- of liquid oxygen (ESTREICHER), A., ii, 150.
- Helianthotannic acid in *Helianthus* (OSBORNE and CAMPBELL), A., i, 716.
- Helianthus*, edestin in (OSBORNE and CAMPBELL), A., i, 716.
- tuberosus*, arginine in (SCHULZE), A., ii, 383.
- Helium, sources of (WILDE), A., ii, 165.
- in minerals (ERDMANN), A., ii, 570.
- yield from different minerals, and properties of (RAMSAY), A., ii, 596.
- from uraninite (LOCKYER), A., ii, 596.
- absence of, in certain mineral waters (KELLAS and RAMSAY), A., ii, 655.
- presence of, in the gas from the Bath springs and in the atmosphere (RAYLEIGH), A., ii, 599.
- Helium, presence of, in air and water (KAYSER), A., ii, 19.
- in a natural water (MOUREU), A., ii, 298.
- in mineral waters (BOUCHARD), A., ii, 117.
- in sulphuretted waters (TROOST and OUVRARD; BOUCHARD), A., ii, 298.
- &c., state of, in minerals (TILDEN), A., ii, 655.
- density and atomic weight of (LANGLET), A., ii, 99.
- probable atomic weights of constituents of (RUNGE and PASCHEN), A., ii, 2.
- position of, in the periodic system (DEELEY; PREYER), A., ii, 418.
- homogeneity of (RAMSAY and COLLIE), A., ii, 645.
- classification of (WILDE), A., ii, 165.
- chemical analogies of (HILL), A., ii, 418.
- refractivity of (RAYLEIGH), A., ii, 598.
- spectrum of (CROOKES), A., ii, 1.
- spectrum of gas from cleveite (RUNGE and PASCHEN), A., ii, 1.
- wave-length of the line D₃ in the solar spectrum (PALMER), A., ii, 405.
- behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.
- expansion of, by heat (KUENEN and RANDALL), A., ii, 598.
- viscosity of (RAYLEIGH), A., ii, 599.
- absorbed by cleveite, iron, and palladium (TILDEN), A., ii, 656.
- combination of, with magnesium (TROOST and OUVRARD), A., ii, 99.
- Helmholtz memorial lecture (FITZGERALD), T., 885; P., 1896, 25.
- discussion on (HARCOURT, LISTER, FRANKLAND, RAYLEIGH, ROSCOE, ARMSTRONG, POYNTING), P., 1896, 26.
- "Helvetia-green" (PRUD'HOMME), A., i, 485.
- Hemicelluloses, fermentation of (GRÜSS), A., ii, 670.
- Hemimellitene (1 : 2 : 3-trimethylbenzene), synthesis of (LUCAS), A., i, 418.
- Hemimellitic acid (1 : 2 : 3-benzenetricarboxylic acid) and its salts (GRAEBE and LEONHARDT), A., i, 437.
- from methylpurpurroxanthin (SCHUNCK and MARCHLEWSKI), T., 70; P., 1895, 203.
- etherification of (MEYER), A., i, 547.
- Hemimellitic anhydride (GRAEBE and LEONHARDT), A., i, 437.

- Hemimellitimid and its salts (GRAEBE and LEONHARDT), A., i, 437.
- Hemimorphite from Silesia (TRAUBE), A., ii, 255.
- α -Hemipinamic acid, silver salt (HOOGEWERFF and VAN DORP), A., i, 315.
- β -Hemipinamic acid, silver salt (HOOGEWERFF and VAN DORP), A., i, 315.
- Hemp, edestin, a proteid in (OSBORNE and CAMPBELL), A., i, 716.
- Indian, charas, the resin of (WOOD, SPIVEY, and EASTERFIELD), T., 539; P., 1896, 76.
- Hempseed oil, oxidisability of (BISHOP), A., ii, 399.
- Hendecenoic acid (*undecylenic acid*) dibromide, action of alcoholic potash on (KRAFFT), A., i, 665.
- bromo-, action of potassium carbonate on, in alcoholic solution (KRAFFT), A., i, 665.
- HENDECINOIC ACIDS:—
- Hendecinoic acid (*undecolic acid*) and oxidation (KRAFFT), A., i, 665.
- Dehydrohendecenoic acid (*dehydroundecylenic acid*) and its oxidation (KRAFFT), A., i, 665.
- action of potash on (KRAFFT), A., i, 665.
- ethylic salt (KRAFFT), A., i, 666.
- HENDECINYLIC ALCOHOL:—Methylallylhexenylcarbinol (*homolinalol*) from methylheptenone (BARBIER and BOUVEAULT), A., i, 491.
- and its acetate (TIEMANN and SCHMIDT), A., i, 271.
- action of sulphuric acid on (TIEMANN and SCHMIDT), A., i, 271.
- oxidation of (TIEMANN and SCHMIDT), A., i, 271, 272.
- iso*-Hendecylamine (*isoundecylamine*), action of carbon bisulphide on (PONZIO), A., i, 636.
- Heptanaphthene. See Methylcyclohexane.
- HEPTANES:—
- Heptane, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- $\delta\delta$ -dinitro- (BORN), A., i, 199.
- δ -nitro- δ -nitroso- (BORN), A., i, 199.
- Diisopropylmethane, $\gamma\gamma$ -dinitro- (BORN), A., i, 199.
- γ -nitro- γ -nitroso- (BORN), A., i, 199.
- Methyl- α -ethylpropylmethane, $\beta\beta$ -dinitro- (BORN), A., i, 199.
- Heptane-3 : 3 : 5 : 5-tetracarboxylic acid, ethylic salt, action of heat and of sulphuric acid on (AUWERS and SINGHOFF), A., i, 642.
- cyclo*-Heptenamine from palegone, carbamide, and semicarbazone (WALLACH), A., i, 310.
- iso*-Heptenolactone (FITTIG and WOLFF), A., i, 136.
- HEPTINENES:—
- Heptinene (*ænanthylidene*), action of water on (DESGREZ), A., i, 2.
- Methylbutylacetylene, action of water on (DESGREZ), A., i, 2.
- Heptoaldehyde (*ænanthaldehyde*), action of nitric acid on (PONZIO), A., i, 461.
- Heptoic acid (*ænanthoic acid*) (PONZIO), A., i, 461.
- magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- ethylic salt, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
- phenylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1075, 1076, 1078, 1180, 1239.
- methylamide, action of nitric acid on (FRANCHIMONT), A., i, 602.
- iso*-Heptoic acid, bromo-, action of water on (FITTIG and WOLFF), A., i, 136.
- $\beta\gamma$ -dibromo- (FITTIG and WOLFF), A., i, 136.
- HEPTOLACTONE:—Ethylvalerolactone (HJELT), A., i, 598.
- Heptylamine, action of carbon bisulphide on (PONZIO), A., i, 636.
- HEPTYLENE:—Dimethylisopropylethylene (REFORMATSKY), A., i, 127.
- HEPTYLIC ALCOHOL:—Triethylcarbinol, action of bromine on (IPATIEFF), A., i, 402.
- Heptylideneacetoacetic acid, ethylic salt of (KNOEVENAGEL), A., i, 211.
- Heptylideneanthranilic acid (NIEMEN-TOWSKI and ORZECOWSKI), A., i, 188.
- Heptylidenebisacetonedicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 212.
- Heptylthiocarbimide and its behaviour with hydrogen sulphide (PONZIO), A., i, 636.
- Hercynite from Valtellina (LINCK), A., ii, 183.
- Herring meal. See Agricultural chemistry.
- Hessonite. See Essonite.
- Heteroproteose. See Proteose.
- Heteroxanthine. See Xanthine.
- Heulandite from Thuringia (FROMME), A., ii, 370.
- action of acid on (RINNE), A., ii, 368.
- absorption of ammonia by dehydrated (FRIEDEL), A., ii, 481.

- Hexabenzoylmyricetin, preparation and properties of (PERKIN and HUMMEL), T., 1291; P., 1896, 145.
- Hexaethylmyricetin, preparation and properties of (PERKIN and HUMMEL), T., 1291; P., 1896, 145.
- Hexadecylamine hydrochloride, boiling points of solutions of (KRAFFT and STRUTZ), A., ii, 467.
- palmitate, colloidal nature of solutions of (KRAFFT and STRUTZ), A., ii, 468.
- Hexadecylene, monobromo-, action of alcoholic potash on (KRAFFT), A., i, 665.
- HEXADECYLINENES:—
- Methyltridecylacetylene, from brom-hexadecylene (KRAFFT), A., i, 666.
- Tetradecylacetylene, from brom-hexadecylene (KRAFFT), A., i, 665.
- cyclo*-Hexadiene (*dihydrotoluene*) (KNOEVENAGEL), A., i, 288.
- cyclo*-Hexadiene-1 : 2-dicarboxylic acid (*dihydrophthalic acid*) (HOWE), A., i, 481.
- Hexahydroanthranilic acid : ethylic salt and amide of (EINHORN and BULL), A., i, 472.
- Hexahydrocinchomeronic acid and its salts (KOENIGS and WOLFF), A., i, 698.
- hydrochloride of (KOENIGS), A., i, 252.
- Hexahydro-*n*-eumene. See Propyl-*cyclohexane*.
- Hexahydro- ψ -eumene. See 1 : 2 : 5-Trimethyl-*cyclohexane*.
- Hexahydrocymene. See 1 : 4-Methyl-*isopropylcyclohexane*.
- Hexahydrolepidinic acid, hydrochloride of (KOENIGS), A., i, 252.
- Hexahydrophenylaminoacetic acid, hydrochloride of (EINHORN), A., i, 552.
- Hexahydropyridine-3 : 5-dicarboxylic acid. See Hexahydrocinchomeronic acid.
- Hexahydroquinolinic acids and their hydrochlorides, methylic and ethylic salts, and nitroso-compounds (BESTHORN), A., i, 252.
- Hexahydrotoluene. See Methyl-*cyclohexane*.
- Hexahydro-*p*-toluic acid. See 1 : 4-Methyl-*cyclohexane*-carboxylic acid.
- Hexahydroxybenzene, oxidation of (BERTRAND), A., i, 534.
- Hexahydro-*m*-xylene. See 1 : 3-Dimethyl-*cyclohexane*.
- Hexahydro-*p*-xylic acid. See 1 : 2-Dimethyl-*cyclohexane*-4-carboxylic acid.
- Hexamethoxyrosolic acid, constitution of (HOFMANN LECTURE), T., 627.
- Hexamethylbenzene, preparation of (HOFMANN LECTURE), T., 721.
- Hexamethylenediamine. See Hexylenediamine.
- o*-Hexamethylenediamine. See *cyclo*-Hexane, 1 : 2-diamino-.
- Hexamethylenetetramine, proposed formulæ for (DUDEN and SCHARFF), A., i, 122.
- mereurochlorides and mereuroiodide of (DELÉPINE), A., i, 78.
- Hexamethylethylenediammonium, salts of (SCHNEIDER), A., i, 201.
- Hexamethyltriaminotriphenylamylmethane (ROSENSTIEHL), A., i, 377.
- Hexamethyltriaminotriphenylcarbinol trimethiodide and trimethohydroxide of (ROSENSTIEHL), A., i, 376.
- Hexamethyltriaminotriphenylethoxymethane (ROSENSTIEHL), A., i, 376.
- Hexamethyltriaminotriphenylhydroxymethane, methiodide of (ROSENSTIEHL), A., i, 377.
- Hexamethyltriaminotriphenyliodomethane, methiodide of (ROSENSTIEHL), A., i, 377.
- Hexamethyltriaminotriphenylmethane, trimethiodide and trimethohydroxide of (ROSENSTIEHL), A., i, 376.
- Hexamethyltriaminotriphenylmethoxymethane and its trimethiodide, and monomethiodide (ROSENSTIEHL), A., i, 376.
- Hexane, normal, from light petroleum (THOMAS and YOUNG), P., 1895, 172.
- normal, physical constants of (THOMAS and YOUNG), P., 1895, 174.
- dinitro- (PONZIO), A., i, 461.
- cyclo*-Hexane, stereoisomerism of (WILLSTÄTTER), A., i, 452.
- 1 : 2-diamino-, and its hydrochloride (EINHORN and BULL), A., i, 472.
- Hexane-2 : 6-ketol. See *n*-Acetylbutylic alcohol.
- HEXANETRICARBOXYLIC ACID: (*d*-iso-Propylpropane-*dd*₁*d*₁-tricarboxylic) acid, and salts (PERKIN), T., 1492, 1493; P., 1896, 170, 154; (HEINKE and PERKIN), T., 1507; P., 1896, 155.
- action of heat on (PERKIN), T., 1495.
- ethylic salt (PERKIN), T., 1490, 1491; P., 1896, 170, 154; (HEINKE and PERKIN), T., 1507; P., 1896, 155; (AUWERS and TITHERLEY), A., i, 643.
- action of alcoholic potash on (HEINKE and PERKIN), T., 1507; P., 1896, 155.
- sodio-, action of phenoxyethylic brom-

ide on (PERKIN), T., 1504; P., 1896, 170.

cyclo-Hexanone, condensation of, with benzaldehyde (PETRENKO-KRITSCHENKO and ARZIBASCHEFF), A., i, 671.

3-*cyclo*-Hexanone-1-carboxylic acid and its ethylic salt (EINHORN and COBLITZ), A., i, 531.

cyclo-Hexenedicarboxylic acids (*tetrahydrophthalic acids*) (HOWE), A., i, 481.

HEXENOIC ACIDS:—

$\alpha\beta$ -*iso*-Hexenoic acid, action of bromine, hydrogen bromide, and sulphuric acid on (BRAUN), A., i, 594.

oxidation of (BRAUN), A., i, 594.

$\beta\gamma$ -*iso*-Hexenoic acid, and the action of sulphuric acid on (BRAUN), A., i, 594.

α -Ethylcrotonic acid (*ethylallylacetic acid*) (HJELT), A., i, 598.

iso-Propylacrylic and trimethylacrylic acids, preparation of the mixed ethereal salts of (PERKIN), T., 1488; P., 1896, 170, 154.

ethylic salt, action of ethylic sodiomalonate on (PERKIN), T., 1490; P., 1896, 170, 154.

Trimethylacrylic acid (PERKIN), T., 1478; P., 1896, 170, 154; (PERKIN and THORPE), T., 1485; P., 1896, 157.

action of bromine on (PERKIN), T., 1480; P., 1896, 154; (PERKIN and THORPE), P., 1896, 157.

action of hydrobromic and hydriodic acids on (PERKIN), T., 1481; P., 1896, 154.

action of phosphorus trichloride on (PERKIN), T., 1480.

ethylic salt, action of ethylic malonate on (PERKIN), T., 1495.

anilide of (PERKIN), T., 1480.

chloride of and action of aniline on (PERKIN), T., 1480.

cyclo-Hexenyl methyl ketone (*tetrahydroacetophenone*) and granatal, identity of (CIAMICIAN and SILBER), A., i, 397.

Hexethylethylenediphosphonium dibromide, preparation of (HOFMANN LECTURE), T., 678.

dichloride, preparation of (HOFMANN LECTURE), T., 680.

diiodide and dihydrate, action of heat on (HOFMANN LECTURE), T., 678.

HEXINENES:—

Dipropenyl (DELACRE), A., i, 591.

Methylisopropylacetylene (IPATIEFF), A., i, 330.

HEXINENES:—

Methylisopropylacetylene, bromo- (IPATIEFF), A., i, 330.

Trimethylisallylene, (IPATIEFF), A., i, 330.

HEXOIC ACIDS:—

iso-Hexoic acid (*iso-butylacetic acid*), α -bromo-, action of ethylic sodioacetoacetate on (AUWERS and SCHIFFER), A., i, 644.

ethylic salt (AUWERS and SCHIFFER), A., i, 644.

β -bromo- (BRAUN), A., i, 594.

$\alpha\beta$ -dibromo- (BRAUN), A., i, 594.

$\alpha\beta\beta$ -Trimethylpropionic acid (*α -methylisopropylacetic acid*, *α -methylisovaleric acid*) (PERKIN), T., 1476.

action of heat on (PERKIN), T., 1477.

action of bromine and phosphorus pentabromide on (PERKIN), T., 1478.

$\alpha\beta\beta$ -Trimethylpropionic acid

α -bromo-, ethylic salt (PERKIN), T., 1478.

action of alcoholic potash on (PERKIN), T., 1478, 1485, 1486; P., 1896, 170.

action of ethylic sodiomalonate on (PERKIN and THORPE), T., 1485, 1498.

action of quinoline on (PERKIN), T., 1489; P., 1896, 170, 154.

β -bromo- (PERKIN), T., 1481; P., 1896, 170, 154; (PERKIN and THORPE), T., 1484; P., 1896, 156.

ethylic salt (PERKIN and THORPE), T., 1484.

action of alcoholic potash on (PERKIN), T., 1478, 1485, 1486; P., 1896, 170.

action of ethylic sodiomalonate on (PERKIN), T., 1485, 1498.

hydrolysis of (PERKIN and THORPE), P., 1896, 157.

dibromo- (PERKIN), T., 1480; P., 1896, 170, 154; (PERKIN and THORPE), P., 1896, 157.

β -iodo- (PERKIN), T., 1481; P., 1896, 170, 154; (PERKIN and THORPE), T., 1485; P., 1896, 157.

ethylic salt (PERKIN and THORPE), T., 1485.

γ -*iso*-Hexolactone, refraction equivalent of (ANDERLINI), A., ii, 229.

Hexose, change of, to pentose derivatives in cereal celluloses (CROSS, BEVAN, and SMITH), T., 1609; P., 1896, 175.

- Hexose, formation of a pentose-mono-formal from, in plants (CROSS, BEVAN, and SMITH), T., 1610; P., 1896, 175.
- Hexoses, amount of, in nodules (STOKLASA), A., ii, 205.
- Hexylallylcarbinol. See under Decenyllic alcohols.
- β -*iso*-Hexylamine from oxime of mesitylic oxide; its hydrochloride, platinum-chloride, oxalate, and carbamide (KERP), A., i, 448.
- m*-Hexyldihydrotoluene. See 1 : 3-Methylhexylcyclohexadiene.
- HEXYLENES:—
- Hexylene, specific gravity of (WANKLYN), A., i, 2.
- iso*-Hexylene dibromide (IPATIEFF), A., i, 330.
- bromo-, action of alcoholic alkali on (IPATIEFF), A., i, 330.
- dibromo- (IPATIEFF), A., i, 402.
- Tetramethylethylene (REFORMATSKY and PLESCONOSSOFF), A., i, 128; (DELACRE), A., i, 591, 662.
- Hexylenediamine (*hexamethylenediamine*): its hydrochloride and dibenzoyl derivative (CURTIUS and CLEMM), A., i, 464.
- Hexylenediethylurethane (CURTIUS and CLEMM), A., i, 464.
- Hexylene glycol. See Pinacone.
- HEXYLIC ALCOHOLS:—
- Methylisobutylcarbinol, from reduction of mesitylic oxide (KERP), A., i, 448.
- Pinacolic alcohol, action of hydrogen iodide on (DELACRE), A., i, 662.
- Dimethylpropylcarbinol, preparation of (IPATIEFF), A., i, 402.
- action of bromine on (IPATIEFF), A., i, 402.
- Dimethylisopropylcarbinol (REFORMATSKY and PLESCONOSSOFF), A., i, 281.
- Hexylic hydride, specific gravity of (WANKLYN), A., i, 2.
- HEXYLIC:—Tetramethylethylic iodide (REFORMATSKY and PLESCONOSSOFF), A., i, 128.
- m*-Hexyltetrahydro-*m*-cresol. See Methyl-1-hexyl-3-cyclohexenol-5.
- m*-Hexyltoluene, 5-chloro- (GÜNDLICH and KNOEVENAGEL), A., i, 213.
- Heydoarum coronarium*, growth of and the percentage composition of (GRANDEAU), A., ii, 268.
- Hippenybenzylurethane (CURTIUS), A., i, 38.
- Hippenylcarbanil (CURTIUS), A., i, 38.
- dibromo- (CURTIUS), A., i, 39.
- diiodo- (CURTIUS), A., i, 39.
- Hippenylethylurethane (CURTIUS), A., i, 38.
- Hippenylmethylurethane (CURTIUS), A., i, 38.
- Hippuranilide and its nitroso-derivative (CURTIUS), A., i, 38.
- Hippuric acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- ethylic salt (RADENHAUSEN), A., i, 137.
- See also Agricultural chemistry. (Appendix.)
- Hippuroflavin, diamide of (RÜGHEIMER), A., i, 62.
- bismethylanilide, *o*-toluidide, *p*-toluidide and xylylide of (RÜGHEIMER), A., i, 62.
- Hippuro-*p*-toluidide (CURTIUS), A., i, 38.
- Hippuro-*p*-tolylenediamide (CURTIUS), A., i, 38.
- Hippurylazoimide (CURTIUS), A., i, 37.
- Hippurylcinnamylidenehydrazine (CURTIUS), A., i, 37.
- Hippurylhydrazine: its hydrochloride, platinosochloride, and acetyl derivative (CURTIUS), A., i, 37.
- nitroso-. See Hippurylazoimide.
- Hippurylphenylhydrazine, symmetrical: its acetyl and nitroso-derivatives (CURTIUS), A., i, 37.
- Hippuryltropeine (MERCK), A., i, 65.
- Hislopite from India (HOLLAND), A., ii, 261.
- Histidine (KOSSEL), A., i, 582.
- base from albumin identical with (HEDIN), A., i, 659.
- Hoeferite from Bohemia (KATZER), A., ii, 189.
- Hofmann memorial lectures (PLAYFAIR, ABEL, PERKIN, ARMSTRONG), T., 575; P., 1893, 133.
- Hofmann-violet, green dye obtained from (HOFMANN LECTURE), T., 622.
- Holcus lanatus*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Homoasparagine (KÖRNER and MENOZZI), A., i, 206.
- Homoaspartic acid (KÖRNER and MENOZZI), A., i, 206.
- amides of (KÖRNER and MENOZZI), A., i, 206.
- derivatives of, preparation of, from citraconic, mesaconic, and itaconic acids and alcoholic ammonia (KÖRNER and MENOZZI), A., i, 205, 206.

- Homocamphoric acid. See Hydroxycamphocarboxylic acid.
- Homocinchonidine, possible formation of, from cinchonine (KOENIGS and HUSMANN), A., i, 707.
- and salts, microchemical reactions of (BEHRENS), A., i, 514.
- Homolinalol. See Methylallylhexenylcarbinol, under Hendecinylic alcohols.
- Homopiperonylic acid, bromo- (ANGELI), A., i, 296.
- Homopiperonyloxamic acid (ANGELI), A., i, 295.
- Homopyrocatechol, magnetic rotatory power, &c., of (PERKIN), T., 1135, 1183, 1239.
- Homoterpenoylformic acid, oxime of (VON BAEYER), A., i, 621.
- Homoterpenylic acid (VON BAEYER), A., i, 622.
- Homotropinic acid (*granatic acid*) and its aurochloride (CIAMICIAN and SILBER), A., i, 297.
- Honey, examination of, and detection of molasses and starch sugar in (BECKMANN), A., ii, 582.
- estimation of levulose in (WILEY), A., ii, 342.
- Hops. See Agricultural chemistry. (Appendix.)
- Hordein in barley meal (OSBORNE), A., i, 455.
- Hordeum vulgare*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Hornblende from British Columbia (HOFFMANN), A., ii, 257.
- from Japan (KOTŌ), A., ii, 39.
- from Lioran (FOUQUÉ), A., ii, 533.
- from Naples (FRANCO), A., ii, 313.
- a new alkali, from Ontario (ADAMS and HARRINGTON), A., ii, 374.
- Hortonolite from Monroe, N.Y. (PENFIELD and FORBES), A., ii, 373.
- Huascalite from New South Wales (LIVERSIDGE), A., ii, 658.
- Humite from Nordmark, Sweden (SJÖGREN), A., ii, 114.
- Humus, solubility of, in vegetable infusions (BRÉAL), A., ii, 670.
- Hyacinth. See Quartz.
- Hydantoic acid (WEIDEL and ROITHNER), A., i, 471.
- Hydantoinacetic acid, thio-, and its products of oxidation (ANDREASCH), A., i, 89.
- Hydracetylacetone, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1237.
- Hydræmic plethora, artificial (LEATHES), A., ii, 50.
- Hydrargillite. See Gibbsite.
- Hydrastine, physiological action of derivatives of (FALK), A., ii, 201.
- Hydrastinine, physiological action of (v. BUNGE), A., ii, 492.
- Hydrazi-derivatives, oxidation of (CURTIUS), A., i, 339.
- Hydrazibenzil, action of heat on (CURTIUS), A., i, 339.
- Hydrazides, action of iodine on (CURTIUS), A., i, 339.
- action of nitrous acid and diazo-salts on (CURTIUS), A., i, 339.
- condensation of, with aldehydes (CURTIUS), A., i, 339.
- Hydrazimine, derivatives of. See *iso-Dihydotetrazine*.
- Hydrazine, general account of (CURTIUS), A., i, 337.
- formation of, by reduction of nitroso-sulphates (DIVERS and HAGA), T., 1613; P., 1896, 179.
- action of nitrous anhydride on (CURTIUS), A., i, 338.
- behaviour of, towards nitrodiazobenzene (VON PECHMANN), A., i, 680.
- reducing action of (CURTIUS), A., i, 338.
- Hydrazine hydrate, constitution of (CURTIUS), A., i, 339.
- action of ethylic iodide on (CURTIUS), A., i, 339.
- behaviour towards ethylic derivatives of nitrophenols (PURGOTTI), A., i, 363.
- sulphate (CURTIUS), A., i, 338.
- thiocyanate (CURTIUS and HEIDENREICH), A., i, 143.
- action of heat on (CURTIUS and HEIDENREICH), A., i, 143.
- phthalyl, isophthalyl, and terephthalyl derivatives (CURTIUS and DAVIDIS), A., i, 680.
- Hydrazinecarboxylic acid, ethylic salt, hydrochloride of (THIELE and LACHMANN), A., i, 208.
- Hydrazines, *o*-nitro-, behaviour of, towards nitrous acid (ZINCKE), A., i, 420.
- Hydrazinoacetic acid, and its hydrolysis (CURTIUS), A., i, 338.
- Hydrazinobutyric acid (TRAUBE and LONGINESCU), A., i, 340.
- benzylidene derivative of (TRAUBE and LONGINESCU), A., i, 340.
- Hydrazinoisobutyric acid (THIELE and HEUSER), A., i, 340.
- action of ethylic acetoacetate on (THIELE and HEUSER), A., i, 341.
- hydrochloride, sulphate, and nitrate of (THIELE and HEUSER), A., i, 341.

- Hydrazinoisobutyric acid, ethylic salt and its hydrochloride (THIELE and HEUSER), A., i, 341.
 methylic salt (THIELE and HEUSER), A., i, 341.
- Hydrazinodiisobutyric acid and its salts (THIELE and HEUSER), A., i, 341.
 action of heat on (THIELE and HEUSER), A., i, 341.
 dinitroso-derivative (THIELE and HEUSER), A., i, 341.
 mononitrile of (*hydrazoisobutyronitrilic acid*) (THIELE and HEUSER), A., i, 341.
- Hydrazinodiisobutyronitrile and its oxidation (THIELE and HEUSER), A., i, 341, 342.
- Hydrazinopropionic acid (TRAUBE and LONGINESCU), A., i, 340.
 hydrochloride of (TRAUBE and LONGINESCU), A., i, 340.
 benzylidene derivative (TRAUBE and LONGINESCU), A., i, 340.
 condensation of, with ethylic acetate (TRAUBE and LONGINESCU), A., i, 340.
- Hydrazinothiocarbonamide (CURTIUS and HEIDENREICH), A., i, 143.
- Hydrazinovaleric acid (TRAUBE and LONGINESCU), A., i, 340.
 benzylidene derivative (TRAUBE and LONGINESCU), A., i, 340.
 salicylidene derivative (TRAUBE and LONGINESCU), A., i, 340.
- Hydrazioxalyl (CURTIUS), A., i, 35.
- Hydrazobenzene (CURTIUS), A., i, 339.
 discovery of (HOFMANN LECTURE), T., 689.
- Hydrazodicarbonamide (SCHOLTZ), A., i, 343.
- Hydrazodicarbothioallylamide, action of hydrochloric acid on (FREUND and HEILBRUN), A., i, 415.
- Hydrazonephenylglyoxylic acid (BOUVEAULT), A., i, 650.
- Hydrazones, behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.
- p*-Hydrazophenylic ether (HAEUSSERMANN and ZEICHMANN), A., i, 533.
- Hydrindene, magnetic rotatory power, &c., of (PERKIN), T., 1083, 1144, 1153, 1196, 1197, 1229, 1242.
- Hydrindone, magnetic rotatory power, &c., of (PERKIN), T., 1093, 1201, 1243.
- α -Hydrindone, action of bromine on (REVIS and KIPPING), P., 1895, 214.
 dibromo- (REVIS and KIPPING), P., 1895, 214.
 action of alcoholic potash on (REVIS and KIPPING), P., 1895, 214.
- Hydrobenzoin, preparation of (KAUFFMANN), A., i, 650.
- iso*-Hydrobenzoin, preparation of (KAUFFMANN), A., i, 650.
 from the electrolysis of potassium mandelate (WALKER), T., 1279.
- Hydrobilirubin, absorption spectrum of (GAMGEE), A., i, 714.
- Hydroboracite, formula of (KOSMANN), A., ii, 368.
- Hydrocarbon, C_6H_{10} (IPATIEFF), A., i, 402.
 C_6H_{10} , from reduction of mesitylic oxide; its oxime and tribromo-derivative (KERP), A., i, 448.
- C_8H_{14} , derived from dihydrociscampholytamide (NOYES), A., i, 696.
- C_9H_{16} , from pulegonic acid, and its nitrosochloride (WALLACH), A., i, 310.
- C_9H_{20} , from action of alcohol and zinc dust on dibromodipropylisopropylic alcohol (OBERREIT), A., i, 666.
- $C_{10}H_{16}$, from oil of valerian (OLIVIERO), A., i, 492.
- $C_{10}H_{22}$, from Berea grit petroleum (MABERY and DUNN), A., i, 329.
- $C_{11}H_{18}$, from homolinalol and camphoric or succinic anhydride (TIEGMANN and SCHMIDT), A., i, 271.
- $C_{11}H_{24}$, from Berea grit petroleum (MABERY and DUNN), A., i, 329.
- $C_{12}H_{26}$, from Berea grit petroleum (MABERY and DUNN), A., i, 329.
- $(C_{13}H_{10})_n$ (KLINGER and LONNES), A., i, 374.
- $C_{14}H_{12}$, from benzylic ethylic ether (SCHICKLER), A., i, 490.
- $C_{15}H_{22}$, from santalal (CHAPMAN and BURGESS), P., 1896, 140.
- $C_{16}H_{24}$, from cholesterylene (MAUTHNER and SUIDA), A., i, 426.
- $C_{19}H_{28}$, from cholesterylic chloride (MAUTHNER and SUIDA), A., i, 426.
- $C_{20}H_{30}$, from cholesterylene (MAUTHNER and SUIDA), A., i, 426.
- $C_{20}H_{36}$, from menthol (TOLLOCZKO), A., i, 381.
- $C_{26}H_{16}$, from the reduction of tetraphenylenepinacolin (KLINGER and LONNES), A., i, 691.
- $C_{26}H_{18}$, from the reduction of diphenyldiphenylenepinacolin (KLINGER and LONNES), A., i, 691.
- $C_{29}H_{60}$, from Charas (WOOD, SPIVEY, and EASTERFIELD), T., 543; P., 1896, 76.
- Hydrocarbon flames. See Flames.
- Hydrocarbons in coal-tar (HOFMANN LECTURE), T., 693.

Hydrocarbons, molecular weight,
volume, and constitution of
(TRAUBE), A., ii, 153.
poisonous effect of, on algæ and in-
fusoria (BOKORNY), A., ii, 669.
aromatic, synthesis of (TÖHL), A., i,
16; (JANNASCH), A., i, 147.
bromo-, action of, on lead salts of
thiophenols (BOURGEOIS), A., i,
17.
natural, possible explanation of the
formation of (MOISSAN), A., i, 633.
unsaturated, union of the elements of
water with (DESGREZ), A., i, 2.

Hydrocarbons. See also:—

Acenaphthene.
Acetylene.
Allylbenzene.
Allylene (*methylacetylene*).
Amylene.
β-*iso*-Amylnaphthalene.
Anthracene.
Benzene.
p-Bidiphenyl.
iso-Butenylbenzene.
iso-Butylbenzene.
iso-Butylene.
Camphene.
Cardene.
Cedrene.
Cholesterylene.
Cinnamene.
Citrene.
Cumene.
ψ-Cumene.
Cymene.
Decadiene, 1 : 3-.
Dianthracene (*paranthracene*).
Dibenzyl.
Dihydrodiphenyl.
Dimethylisoallylene.
1 : 2-Dimethyl-4 : 5-diphenylhexa-
methylene.
1 : 3-Dimethylcyclohexane.
1 : 3-Dimethylcyclohexadiene.
1 : 4-Dimethylnaphthalene.
1 : 3-Dimethylcyclopentane.
Dimethylisopropylethylene.
Dimethylstilbene.
Dipentene.
Diphenyl.
Diphenylacetylene (*tolane*).
m-Diphenylbenzene.
4 : 5-Diphenyl-1 : 2-dimethylcyclo-
hexane.
Diphenyldiphenylene-ethane.
ass-Diphenyldiphenylene-ethane.
Diphenyldiphenylene-ethylene.
Diphenyldiphenylenethylene.
Diphenylmethane.
Diphenylcyclopentane.
Dipropenyl.

Hydrocarbons. See:—

Ethane.
Ethylbenzene.
Ethyleymene.
Ethylene.
Ethylidenecyclopropane.
Ethylidenetrimethylene.
p-Ethyltoluene.
Heptane.
Heptinene (*ænanthylidene*).
cyclo-Hexadiene.
Hexahydrocymene (*menthane* 1 : 4-
methylpropylcyclohexane).
Hexahydro-*m*-xylene (1 : 3-*dimethyl*-
cyclohexane).
Hexamethylbenzene.
Hexane.
Hexylene.
Hydrindene.
Indene.
Laurolene.
Ledene.
Limonene.
Menthane.
Menthonaphthene.
Mesitylene.
Methane.
Methylacetylene.
Methylamylacetylene.
Methylbutylacetylene.
Methylethylethylene.
Methylhexylcyclohexadiene.
Methylcyclohexane.
1 : 4-Methylpropylcyclohexane.
1 : 3-Methylisopropylcyclohexadiene.
Methylisopropylacetylene.
Methylisopropylbenzene.
Methyltridecylacetylene.
Naphthalene.
Octinene (*methyl-6-heptandiene*;
1 : 3-*caprylidene*).
Paraffin.
Phenanthrene.
Phenylacetylene.
o- and *m*-Phenyltoluenes.
Phenyl-*p*-tolylmethane.
Pinene.
Propylbenzene and *iso*-Propylbenzene.
Propylene.
Sesquiterpene.
Stilbene.
Terpene.
Terpinolene.
Tetradecylacetylene.
Tetrahydrotoluene.
Tetramethylethylene.
Tetraphenyldiphenylenepropane.
Tetraphenylethylene.
Tetraphenylmethylene.
Tolane.
Toluene.
Trimethylisoallylene.

Hydrocarbons. See:—

Trimethylbenzene.

Trimethylene.

Trimethylethylene (*amylene*).

1 : 2 : 5-Trimethylcyclohexane.

Triphenylmethane.

Vinylcyclopropane (*vinyltrimethyl-*
ene).

o-, *m*-, and *p*-Xylenes.

Hydrocarbostyryl-3'-carboxylic acid and
its silver salt (REISSERT), A., i,
392.

ethylic salt of (REISSERT), A., i, 392.

Hydrocinnamic acid. See Phenyl-
propionic acid.

Hydrocotarnine, action of benzaldehyde
and cinnamaldehyde on (LIEBER-
MANN), A., i, 711.

action of bromopropionic acid on (LIE-
BERMANN), A., i, 711.

action of methylnoropropionic acid
on (LIEBERMANN), A., i, 711.

action of nitro-propionic acid on (LIE-
BERMANN), A., i, 711.

Hydrocotarninephthalide and its salts
(LIEBERMANN), A., i, 264.

Hydrogen, possible occurrence of, in air
(PHILLIPS), A., ii, 162.

atomic weight of (THOMSEN), A., ii,
244; (MORLEY), A., ii, 640.

spectrum of the flame of (BOHN), A.,
ii, 140.

behaviour of, when submitted to the
electric discharge (COLLIE and
RAMSAY), A., ii, 634.

boiling point and critical tempera-
ture of (OLZEWSKI), A., ii, 9.

liquefaction of (DEWAR), P., 1895,
229; (RAMSAY), P., 1895, 231.

density of (THOMSEN), A., ii, 471;
(MORLEY), A., ii, 595.

direct union of, with carbon (BONE
and JORDAN), P., 1896, 61.

combination of, with oxygen (MEYER
and RAUM), A., ii, 162.

rate of combination of oxygen and
(GAUTIER and HÉLIER), A., ii, 416.

velocity of attraction of oxygen for
(TECLU), A., ii, 14.

explosive mixtures of air and
(CLOWES), P., 1895, 201.

oxidation by palladinised copper
oxide (CAMPBELL), A., ii, 171.

influence of, on fermentation by yeast
(RAPP), A., ii, 668.

Hydrogen peroxide, anhydrous, pre-
paration of (BRÜHL), A., ii, 162.

production of, during oxidation
(DIXON), T., 779; P., 1896, 56.

formation of, in the electrolysis
of dilute acid (RICHARZ and
LONNES), A., ii, 586.

Hydrogen peroxide, formation of, from
ether by action of light
(RICHARDSON and FORTEY), T.,
1352; P., 1896, 165.

formation of, from certain organic
substances by action of light
(RICHARDSON and FORTEY), T.,
1349; P., 1896, 164, 165.

physical constants of (BRÜHL), A.,
ii, 163.

decomposition of (SPRING), A., ii,
92.

action of, on ammoniacal copper
compounds (VITALI), A., ii, 92.

velocity of the reaction between
hydriodic acid and (NOYES and
SCOTT), A., ii, 158; (HARCOURT
and ESSON), A., ii, 238.

reaction of silver oxide and
(RIEGLER), A., ii, 471.

reaction of furfuroids with (CROSS,
BEVAN, and SMITH), T., 1607;
P., 1896, 174.

oxidation of pentoses by (CROSS,
BEVAN, and SMITH), T., 815;
P., 1896, 96.

non-occurrence of, in plants (CHO),
A., ii, 60.

separation of ozone from (ENGLER
and WILD), A., ii, 574.

Hydrogen, delicate reaction for (PHIL-
LIPS), A., ii, 162.

estimation of, by palladious chloride
(CAMPBELL and HART), A., ii, 496.

estimation of, in presence of methane
(GILL and HUNT), A., ii, 341.

Hydrolapachol, chlor- (HOOKER), T.,
1361.

Hydrolysis and etherification (WEG-
SCHEIDER), A., i, 95.

facility of (BRÜHL), A., i, 178.

of salicin by acids (NOYES and HALL),
A., ii, 159.

See also Velocity of hydrolysis.

Hydrolytic decomposition in aqueous
solution (KRAFFT and STRUTZ), A.,
ii, 467.

Hydrometasantonin and its oxime
(FRANCESCONI), A., i, 378.

Hydrothiosuccinic acid. See Succinic
acid, hydrothio-.

Hydrotiglic acid. See Valeric acid.

α -Hydroxy-acids, action of chloral on
(EDELEANU and ZAHARIA), A., i,
348.

1-Hydroxy-1'-acetyl-3 : 3'-dimethyl-
isoquinoline, hydrochloride, platino-
chloride (COLLIE and WILLSMORE),
T., 301; P., 1896, 47.

o-Hydroxyacetophenone, condensation
of, with benzaldehyde (FRIEDLÄNDER
and RÜDT), A., i, 439.

- 1'-Hydroxy-3'-amylquinoline (NIEMEN-TOWSKI and ORZECOWSKI), A., i, 188.
- Hydroxyanthraquinones, hydroxylation of (WACKER), A., i, 693.
- Hydroxyaposafranone (FISCHER and HEPP), A., i, 323.
formation of, from anilidoaposafranone and from aposafranone (FISCHER and HEPP), A., i, 50.
- Hydroxyazobenzene, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
- p*-Hydroxyazobenzene, benzoyl derivative of (McPHERSON), A., i, 28.
- p*-Hydroxybenzaldehyde, condensation of, with *o*-aminobenzylamine (BUSCH), A., i, 508.
m-bromo-, and its sodium and silver derivatives (PAAL), A., i, 40.
m-iodo- (PAAL), A., i, 40.
- p*-Hydroxybenzaldoxime, *m*-dibromo- (PAAL and KROMSCHRÖDER), A., i, 225.
- o*-Hydroxybenzhydrazide, and its benzylidene derivative (STRUVE and RADENHAUSEN), A., i, 36.
- m*-Hydroxybenzhydrazide, and its benzylidene derivative (STRUVE and RADENHAUSEN), A., i, 36.
- p*-Hydroxybenzhydrazide, and its benzylidene derivative (STRUVE and RADENHAUSEN), A., i, 36.
- o*-Hydroxybenzoic acid. See Salicylic acid.
- m*-Hydroxybenzoic acid (DE CONINCK), A., i, 473.
compound of, with antipyrine (PATEIN and DUFAY), A., i, 650.
ethylic salt of, benzoic derivative of (LIMPRICHT), A., i, 435.
- p*-Hydroxybenzoic acid (DE CONINCK), A., i, 473.
compound of, with antipyrine (PATEIN and DUFAY), A., i, 650.
- p*-Hydroxybenzoic acid, 3-amino-, and its acetate (DIEPOLDER), A., i, 615.
m-bromo- (PAAL), A., i, 40.
m-dibromo- (PAAL and KROMSCHRÖDER), A., i, 225.
- 3-nitro-, and its ammonium salt (DIEPOLDER), A., i, 615.
- p*-Hydroxybenzophenone, a method of preparation of (GRAEBE and ULLMANN), A., i, 440.
and its sodium derivative (COHN), A., i, 440.
- p*-Hydroxybenzophenone, dibromo- (COHN), A., i, 440.
- p*-Hydroxybenzophenone, preparation of (LIMPRICHT), A., i, 435.
- o*-Hydroxybenzoylazoimide (STRUVE and RADENHAUSEN), A., i, 36.
- m*-Hydroxybenzoylazoimide (STRUVE and RADENHAUSEN), A., i, 36.
- p*-Hydroxybenzoylazoimide (STRUVE and RADENHAUSEN), A., i, 36.
- Hydroxybenzylhydrocotarnine, preparation of (LIEBERMANN), A., i, 711.
- Hydroxybenzylideneacetophenone. See Phenyl hydroxystyryl ketone.
- o*-Hydroxybenzylidene-*o*-aminobenzyl-*o*-anisidine (BUSCH, BRUNNER, and BIRK), A., i, 160.
- o*-Hydroxybenzylidene-*o*-aminobenzyl-*p*-bromaniline (BUSCH and HEINEN), A., i, 159.
- o*-Hydroxybenzylidene-*o*-aminobenzyl-*p*-chloraniline (BUSCH and VOLKENING), A., i, 158.
- o*-Hydroxybenzylidene-*o*-aminobenzyl-*p*-phenetidine (BUSCH and HARTMANN), A., i, 160.
- p*-Hydroxybenzylideneaniline, *m*-bromo- (PAAL), A., i, 40.
dibromo- (PAAL and KROMSCHRÖDER), A., i, 225.
- o*-Hydroxybenzylidenediacetophenone, bromo-, and its acetyl derivative (CORNELSON and KOSTANECKI), A., i, 241.
- o*-Hydroxybenzylidenebismethyl-*p*-tolyl ketone and its acetyl derivative (CORNELSON and KOSTANECKI), A., i, 240.
- o*-Hydroxybenzylidenediacetophenone and its acetyl derivative (CORNELSON and KOSTANECKI), A., i, 240.
- p*-Hydroxybenzylidene- α -naphthylamine, *m*-dibromo- (PAAL and KROMSCHRÖDER), A., i, 225.
- o*-Hydroxybenzylidene- β -naphthyl-*o*-aminobenzylhydrazine (BUSCH and BRAND), A., i, 161.
- p*-Hydroxybenzylidene-*p*-toluidine, *m*-dibromo- (PAAL and KROMSCHRÖDER), A., i, 225.
- 2- (or 4-) Hydroxybenzylphenazone, 1-chlor- (KEHRMANN and FÜHNER), A., i, 512.
- δ Hydroxybutane- $\alpha\gamma\delta$ -tricarboxylic acid, lactone of (BESTHORN), A., i, 252.
- Hydroxybutyric acid (WEIDEL and ROITHER), A., i, 470.
- w*-Hydroxy-*cis*- π -camphanic acid and its acetyl derivative (KIPPING), T., 947; P., 1896, 115.
- Hydroxycamphocarboxylic acid (*homocamphoric acid*) and its silver salt (BREIT and ROSENBERG), A., i, 178.
- π -Hydroxycamphoric acid, barium salt, acetyl derivative of the anhydride (KIPPING), T., 938; P., 1896, 115.

- π -Hydroxycamphoric acid, oxidation of (KIPPING), P., 1895, 211.
- Hydroxycamphoronic acid, constitution of (BÉHAL), A., i, 179.
- w*-Hydroxycamphotricarboxylic acid, isomeric lactones, silver salt (KIPPING), T., 961; P., 1896, 115.
- Hydroxycarvone, sodium derivative of (VON BAEYER), A., i, 246.
- Hydroxy- ψ -eumenol, dibromo- (AUWERS and AVERY), A., i, 151.
- acetate (AUWERS and AVERY), A., i, 151.
- ether, and its diacetate (AUWERS and AVERY), A., i, 151.
- compound of, with phenylcarbinide (AUWERS and AVERY), A., i, 151.
- Hydroxydibromocamphorsulphonic acid: its bromide and lactone (LAPWORTH and KIPPING), P., 1896, 78.
- Hydroxydihydrocarvone from oxidation of pinole hydrate: its oxime, semicarbazone (WALLACH), A., i, 571.
- Hydroxydihydrocarvoxime, diacetyl derivative (WALLACH), A., i, 571.
- Hydroxydimethoxycoumarin- β -carboxylic acid and its ethylic salt (BIGINELLI), A., i, 369.
- β -Hydroxy- $\alpha\alpha$ -dimethylglutaric acid (REFORMATSKY), A., i, 206.
- ethylic salt (REFORMATSKY), A., i, 206.
- β -Hydroxy- $\alpha\alpha$ -dimethylglutaric anhydride (REFORMATSKY), A., i, 206.
- α -Hydroxy- $\alpha\beta$ -dimethylglutaric acid, ethylic salt, and the action of hydriodic acid on (MONTEMARTINI), A., i, 667.
- Hydroxydimethylglutaric lactone, bromo-, anilide of (AUWERS, SCHIFFER, and SINGHOF), A., i, 643, 644.
- β -naphthalide of (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- p*-toluidide of (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Hydroxydimethylisohexioic acids. See Hydroxyoctoic acids.
- Hydroxydimethylisopropylpropionic acid. See Hydroxyoctoic acids.
- 2'-Hydroxydiphenylamine, 2:4-diamino- (NIETZKI and SIMON), A., i, 164.
- 4'-Hydroxydiphenylamine, 2:4-diamino-, and its hydrochloride (NIETZKI and SIMON), A., i, 164.
- 4'-Hydroxydiphenylamine, 2:4-dinitro-, and its acetyl derivative (NIETZKI and SIMON), A., i, 164.
- $\alpha\beta\beta$ -Hydroxydiphenylbutyric acid (isophenethylmandelic acid) (JAPP and LANDER), P., 1896, 108.
- γ -Hydroxy- $\beta\gamma$ -diphenylbutyric acid (JAPP and LANDER), P., 1896, 110.
- α -Hydroxy- $\alpha\beta$ -diphenylethylamine, formate of (SÖDERBAUM), A., i, 484.
- formyl, diformyl, acetyl, diacetyl, benzoyl, and dibenzoyl derivatives of (SÖDERBAUM), A., i, 484.
- Hydroxydiphenylethylamine, isomeride of: its hydrochloride and platinochloride (SÖDERBAUM), A., i, 98.
- β -Hydroxy- $\alpha\beta$ -diphenylethylurethane (SÖDERBAUM), A., i, 483.
- α -Hydroxy- $\alpha\beta$ -diphenylmethane, *o*-cyan- (GABRIEL and STELZNER), A., i, 507.
- 1-Hydroxy-1:2-diphenylcyclopentan-4-one (JAPP and LANDER), P., 1896, 107.
- 2-Hydroxy-2:3-diphenylcyclopentanonylacetic acids, α - and β - (JAPP and MURRAY), P., 1896, 147.
- 2-Hydroxy-2:3-diphenylcyclopentanonylacetic acid, β -lactone of (JAPP and MURRAY), P., 1896, 147.
- 3:1:5-Hydroxydiphenyltriazole (WIDMAN), A., i, 630; (YOUNG), A., i, 702.
- acetyl derivative of (WIDMAN), A., i, 630.
- 1:2':4:2-Hydroxydisulphonaphthoic acid, sodium hydrogen, and barium hydrogen salts (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 4'-Hydroxy-4-ethoxy-2'-methylquinoline and its salts (WENGHÖFFER), A., i, 360.
- 2-Hydroxyethylphenazone (KEHRMANN and TIKHVINSKY), A., i, 511.
- Hydroxyethyltriethylphosphonium hydroxide, preparation of (HOFMANN LECTURE), T., 678.
- Hydroxyfumaric acid, identity of, with oxalacetic acid (MICHAEL and BUCHER), A., i, 600.
- $\alpha\gamma$ -Hydroxyglutaric acid (GUSTAVSON), A., i, 669.
- HYDROXYHEPTOIC ACID:— β -Hydroxytetramethylpropionic acid, (*tetramethylethylenelactic acid*), synthesis of (REFORMATSKY and PLESCONSOFF), A., i, 128.
- ethylic salt (REFORMATSKY and PLESCONSOFF), A., i, 128.
- Hydroxyisohexolactone (FITTIG and WOLFF), A., i, 136.
- Hydroxyhexahydrotolnene. See 3:1-Hydroxymethylcyclohexane.

- Hydroxyhexamethylenecarboxylic acids.
See Hydroxycyclohexanecarboxylic acids.
- 3-Hydroxycyclohexane-1-carboxylamide (EINHORN and COBLITZ), A., i, 530.
- 3-Hydroxycyclohexane-1-carboxylic acid and its salts (EINHORN and COBLITZ), A., i, 530.
- HYDROXYHEXOIC ACIDS :—
- β -Hydroxyisohexoic acid (*hydroxyisocaproic acid*) (BRAUN), A., i, 594.
- Hydroxyisohexoic acid, lactone of (*isocaprolactone*) (BRAUN), A., i, 594.
- β -Hydroxy- $\alpha\beta\beta$ -trimethylpropionic acid (*hydroxy- α -methylisovaleric acid*) (PERKIN and THORPE), T., 1482, 1486, 1487; P., 1896, 156.
- action of hydriodic and hydrobromic acids on (PERKIN), T., 1487; (PERKIN and THORPE), T., 1484, 1485.
- salts of (PERKIN and THORPE), T., 1486, 1487.
- ethylic salt (PERKIN and THORPE), T., 1482; P., 1896, 156.
- Hydroxy- β -isohexylamine, and its oxalate (KEBP), A., i, 448.
- Hydroxyhydrolapachol (HOOKER), T., 1361.
- 2'-Hydroxyindole-2'-carboxylic acid and its acetyl and benzoyl derivatives (REISSERT), A., i, 389
- methylic and ethylic salts (REISSERT), A., i, 389.
- Hydroxyketostearic acid (BEHREND), A., i, 410.
- Hydroxylactone, $C_{10}H_{16}O_3$, from oxidation of pulegonic acid (WALLACH), A., i, 311.
- Hydroxylamine, formation of, by reduction of nitrites (DIVERS and HAGA), T., 1612; P., 1896, 179.
- action of hydrogen iodide on (DUNSTAN and GOULDING), T., 840, 841; P., 1896, 73.
- action of, on nitrobenzene (ANGELI), A., i, 613.
- derivatives from nitro-compounds (BAMBERGER and KNECHT), A., i, 430.
- amidosulphonate (DIVERS and HAGA), T., 1647.
- hydrochloride, action of magnesium on solutions of (VITALI), A., ii, 420.
- oxidising action of (BILTZ), A., i, 690.
- comparison of hydriodides and hydrochlorides of (DUNSTAN and GOULDING), T., 841, 842.
- Hydroxylamine sulphate, preparation of (DIVERS and HAGA), T., 1665; P., 1896, 178.
- action of metallic iodides on (DUNSTAN and GOULDING), T., 840.
- estimation of (DENIGÈS), A., ii, 387.
- Hydroxylaminesuccinylhydroxamic acid (ERRERA), A., i, 209.
- Hydroxylaminic acids, action of nitrous acids on (TRAUBE), A., i, 9.
- Hydroxylaminoacetic acid (TRAUBE) A., i, 9; HANTZSCH and WILD), A., i, 286.
- Hydroxylaminoisobutyric acid. See *iso*-Butyric acid, hydroxylamido-.
- Hydroxylaminoisobutyronitrile. See Isobutyronitrile, hydroxylamido-.
- Hydroxy-*iso*-lapachol, preparation of (HOOKER), T., 1368, 1375.
- Hydroxy- α -lapachone, synthesis of (HOOKER), T., 1370, 1372.
- Hydroxy- β -lapachone, formation of (HOOKER), T., 1381.
- preparation of (HOOKER), T., 1368.
- Hydroxylauronic acid (NOYES), A., i, 696.
- Hydroxymeroquinene and its salts (KOENIGS), A., i, 64.
- Hydroxymethanetrissulphonic acid (VON PECHMANN and MANCK), A., i, 16.
- β -Hydroxy- β -methyladipic acid (TIEMANN and SCHMIDT), A., i, 272.
- p*-Hydroxy-*m*-methylbenzoic acid, lævoptatory ammonium salt of (RÜGHEIMER), A., i, 616.
- 5 : 2-Hydroxymethylcoumalin (RÜHEMANN and WOLFF), T., 1388.
- 5 : 1-Hydroxymethyldihydropyridone-3 : 4-dicarboxylic acid, amide of mon-ethylic salt (RÜHEMANN and TYLER), T., 533; P., 1896, 73.
- Hydroxymethylenebenzyl cyanide, carbanilido-derivative of (WISLICEUS), A., i, 553.
- Hydroxymethylenepherylacetic acid, ethylic salt of, and its salts (WISLICEUS), A., i, 552, 554.
- carbanilido-derivative of (WISLICEUS), A., i, 553.
- 1 (or 2) : 4-Hydroxymethylethylene-phenazone (KEHRMANN and TIKH-VINSKY), A., i, 511.
- β -Hydroxy- δ -methylfurfuraldehyde (KIERMAYER), A., i, 144.
- action of oxalic acid on (KIERMAYER), A., i, 144.
- oxidation of (KIERMAYER), A., i, 144.
- aldoximes of, and their behaviour when heated (KIERMAYER), A., i, 144.
- phenylhydrazone of (KIERMAYER), A., i, 144.

- 1 : 3-Hydroxymethylcyclohexane (*m-hydroxyhexahydrotoluene*) (WALLACH), A., i, 310.
- 2 : 1-Hydroxymethylphenazone and its hydrochloride (KEHRMANN and TIKHVINSKY), A., i, 511.
- 1 (or 4) : 2-Hydroxymethylphenazone, chloro- (KEHRMANN and FÜHNER), A., i, 512.
- 1 (or 2) : 4-Hydroxymethylphenylphenazone (KEHRMANN and TIKHVINSKY), A., i, 511.
- β -Hydroxymethylpicolinic acid, lactone of, and its platinumchloride and barium salts (ZINCKE and WINZHEIMER), A., i, 500.
- β -Hydroxy- δ -methylpyromucic acid and its benzoyl derivative (KIERMAYER), A., i, 144.
- oxidation of (KIERMAYER), A., i, 144.
- 4'-Hydroxy-2'-methylquinazoline, hydrochloride of (NIEMENTOWSKI), A., i, 578.
- Hydroxynaphthadiphenazone, dibromo-, and its sodium derivative [$N : Br_2 : O = 1 : 3 : 5 : 4$; $N : OH = 1 : 4$] (MÖHLAU and UHLMANN), A., i, 167.
- 3 : 4-Hydroxynaphthalenesulphonic acid, 1-amino-, acetyl derivative of (FRIEDLÄNDER and RÜDT), A., i, 568.
- 1' : 3'-Hydroxynaphthalenesulphonic acid, 2-amino- (TAÜBER and WALDER), A., i, 692.
- 2-diazo- (TAÜBER and WALDER), A., i, 692.
- 2-hydrazo- (TAÜBER and WALDER), A., i, 692.
- Hydroxynaphthahaquinone, condensation of, with benzyl-*o*-phenylenediamine (KEHRMANN and TIKHVINSKY), A., i, 511.
- condensation of, with ethyl-*o*-phenylenediamine (KEHRMANN and FÜHNER), A., i, 511.
- β -Hydroxy- α -naphthahaquinone, condensation of, with *iso*-valeraldehyde. See *iso*-Valeraldehyde.
- 2-Hydroxynaphthahaquinone-4-imide, 1-oxime (KEHRMANN and HERTZ), A., i, 566.
- 2 : 1 : 4-Hydroxynaphthahaquinonedimide (KEHRMANN and HERTZ), A., i, 567.
- 1 : 2-Hydroxynaphthoic acid, etherification of (MEYER), A., i, 547.
- 2 : 3-Hydroxynaphthoic acid, constitution of (MÖHLAU ; SCHÖPFF), A., i, 243.
- constitution of, in relation to colour (ARMSTRONG), P., 1896, 42.
- etherification of (ARMSTRONG), P., 1896, 43.
- 2 : 3-Hydroxynaphthoic acid, 1-amino- (MÖHLAU and KRIEBEL), A., i, 242.
- 1-nitroso-, reduction of (MÖHLAU and KRIEBEL), A., i, 242.
- 4-Hydroxynaphthyl-3 : 5-dibromo-4-hydroxyphenylamine (MÖHLAU and UHLMANN), A., i, 167.
- Hydroxyoctaldehyde (*trimethyl-2 : 2 : 4-pentanol-3-al-1*) and its acetyl derivatives (URBAIN), A., i, 590.
- HYDROXYOCTOIC ACIDS :—
- β -Hydroxy- α -dimethylisohexoic acid (*β -hydroxy- α -dimethyl- β -isopropylpropionic* or *diisopropylglycollic acid*), (BARYLOWITSCH), A., i, 11; (FRANKE), A., i, 404.
- of Wohlbrück-Hantzsch, identity of, with diisopropylglycollic acid (BARYLOWITSCH), A., i, 11.
- β -Hydroxy- α -dimethyl- β -isopropylpropionic acid, and the action of hydriodic acid on (REFORMATSKY), A., i, 128, 129.
- ethylic salt (REFORMATSKY), A., i, 128.
- Hydroxyoxamide (SCHIFF and MOWSACCHI), A., i, 209.
- Hydroxypentadecoic acid and its acetyl derivative (CIAMICIAN and SILBER), A., i, 596.
- 3'-Hydroxyphenazine, 3-amino-, and its diaacetyl derivative (NIETZKI and SIMON), A., i, 164.
- γ -Hydroxy- β -phenoxyethylbutyric acid (BENTLEY, HAWORTH, and PERKIN), T., 170 ; P., 1896, 36.
- p*-Hydroxyphenyl *p*-tolyl ketone (LIMPRICHT and SAMIETZ), A., i, 42.
- 3 : 1 : 5-Hydroxyphenylisobutyltriazole and its benzoyl derivative (WIDMAN), A., i, 630.
- ab-p*-Hydroxyphenylcarboxyethylthiocarbamide (DORAN), T., 329 ; P., 1896, 74.
- 4-Hydroxy-5-phenyl-2 : 6-dibenzyl-*m*-diazine, bromo- (HERFELDT), A., i, 393.
- o*-Hydroxyphenylethyl propyl ketone (HARRIES and BUSSE), A., i, 301.
- phenylhydrazone (HARRIES and BUSSE), A., i, 301.
- Hydroxyphenylethylamine, three isomerides of (ERLENMEYER), A., i, 305.
- 3 : 1 : 5-Hydroxyphenylethyltriazole (WIDMAN), A., i, 630.
- p*-Hydroxyphenylic ether (HAEUSSERMANN and BAUER), A., i, 677.
- Hydroxyphenylindazole and its mercurchloride and silver nitrate (AUWERS and SONDHEIMER), A., i, 504.
- iso*-Hydroxyphenylindazole and its

- acetyl derivative (AUWERS and SONDHEIMER), A., i, 504.
- 2-Hydroxyphenylphenazine (KEHRMANN and TIKHVINSKY), A., i, 511.
- 3 : 1 : 5-Hydroxyphenylpropyltriazole (WIDMAN), A., i, 630.
- 3 : 1 : 5-Hydroxyphenylisopropyltriazole and its hydrochloride and acetyl derivatives (WIDMAN), A., i, 630.
- 3 : 1 : 5-Hydroxyphenylstyryltriazole and its sodium derivative (WIDMAN), A., i, 630.
- p*-Hydroxyphenylsuccinamic acid and its salts (PIUTTI), A., i, 223.
- p*-Hydroxyphenylsuccinimide (PIUTTI), A., i, 223.
- p*-Hydroxy-2'-phenyltetrahydroquinazoline (BUSCH), A., i, 508.
- 3 : 1-Hydroxyphenyltriazole (WIDMAN), A., i, 630.
- Hydroxypinic acid (VON BAEYER), A., i, 308, 620.
- Hydroxypinole dibromide, acetyl derivative of (WALLACH), A., i, 102.
- α -Hydroxypropionic acid, β -trichloro-, ethylic salt, action of chloral of (EDELEANU and ZAHARIA), A., i, 348.
- Hydroxyisopropylglutaric acid (FITTIG and WOLFF), A., i, 135.
- α -Hydroxypyridine, nitro- (WEIDEL and MURMANN), A., i, 105.
- dinitro- (WEIDEL and MURMANN), A., i, 105.
- α -Hydroxypyridone, β -chloro-, its sodium and potassium salts and anilide (ZINCKE and WINZHEIMER), A., i, 499.
- dichloro- (ZINCKE and WINZHEIMER), A., i, 501.
- Hydroxyquinacridone (NIEMENTOWSKI), A., i, 261.
- α -Hydroxyquinazoline, chromate of (NIEMENTOWSKI), A., i, 578.
- Hydroxyquinoline, ethobromide of (CLAUS and MOHL), A., i, 697.
- methosulphate, methodichromate, and methoxalate of (CLAUS and MOHL), A., i, 697.
- Hydroxyquinoline, 2 : 4-diamino-, and its salts and diacetyl and dibenzoyl derivative (CLAUS and DEWITZ), A., i, 654.
- 4-bromo-, methiodide and methohydroxide of (CLAUS and MOHL), A., i, 697.
- 2 : 4-dibromo-, and its hydrobromide and dibromide (CLAUS and HOWITZ), A., i, 255.
- 2 : 4 : 3'-tribromo- (CLAUS and HOWITZ), A., i, 255.
- 2 : 4-dinitro-, and its salts (CLAUS and DEWITZ), A., i, 654.
- 3-Hydroxyquinoline, 4-bromo-, hydrobromide of, action of bromine on (CLAUS and HOWITZ), A., i, 255.
- 1 (? 2) : 4 : 3'-tribromo- (CLAUS and HOWITZ), A., i, 255.
- 4-Hydroxyquinoline, action of bromine on (CLAUS), A., i, 449.
- 4-Hydroxyquinoline, 1-bromo- (CLAUS), A., i, 449.
- 3-bromo- (CLAUS); A., i, 449.
- 1 : 3-dibromo- (CLAUS), A., i, 449.
- 1-Hydroxyquinolinephenazine, 2-chloro-, and its hydrochloride (ZINCKE and WEIDERHOLD), A., i, 502.
- 1 : 4 : 3-Hydroxyquinolinequinone, 2-chloro-, and its sodium, acetyl, aniline, and toluidine derivatives and its oxime (ZINCKE and WINZHEIMER), A., i, 499 (ZINCKE and WIEDERHOLD), A., i, 501.
- 4-Hydroxy-1-quinolinesulphonic acid and its sodium salt (CLAUS), A., i, 450.
- o*-Hydroxystyryl propyl ketone (HARRIES and BUSSE), A., i, 301.
- phenylhydrazone (HARRIES and BUSSE), A., i, 301.
- α -Hydroxysuccinic acid, boiling point under reduced pressure of (KRAFFT and DYES), A., ii, 89.
- Hydroxytetrahydrocarvone, from carone (VON BAEYER), A., i, 246.
- 8-Hydroxytetrahydrocarvonebisnitrosylic acid (VON BAEYER), A., i, 246.
- 2 : 3-Hydroxytetrahydronaphthylamine : its picrate, aurochloride, and platinochloride (BAMBERGER and LODTER), A., i, 100.
- β -Hydroxytetramethylpropionic acid. See Hydroxyheptoic acids.
- Hydroxytheophyllin (HIRSCH), A., i, 626.
- action of ammonia on (HIRSCH), A., i, 626.
- exo*-Hydroxy-*o*-toluic acid (EINHORN), A., i, 551.
- Hydroxytoluphenoxazone (KEHRMANN and BÜRGIN), A., i, 707.
- Hydroxytrimethylacetic acid (JUST), A., i, 404.
- β -Hydroxy- $\alpha\alpha\beta$ -trimethyladipic acid (PERKIN and THORPE), P., 1896, 156.
- β -Hydroxy- $\alpha\alpha\beta$ -trimethyladipic acid, lactone of (PERKIN and THORPE), P., 1896, 156.
- α -Hydroxy- $\alpha\beta\beta$ -trimethylglutaric acid, ethylic salt (PERKIN and THORPE), P., 1896, 156.
- β -Hydroxy- $\alpha\alpha\beta$ -trimethylglutaric acid, ethylic salt (PERKIN and THORPE), P., 1896, 156.

β -Hydroxy- $\alpha\alpha\beta$ -trimethylglutaric acid, action of the bromides of phosphorus on (PERKIN and THORPE), P., 1896, 156.

$\alpha\alpha\alpha_1$ -Hydroxytrimethylglutaric lactone, amide of (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.

anilide of (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.

1-Hydroxy-1' : 3' : 3-trimethylisoquinoline : its hydrochloride; oxidation of (COLLIE and WILLSMORE), T., 302; P., 1896, 47.

Hydroxytrimethylsuccinyl (AUWERS and CAMPENHAUSEN), A., i, 525.

Hydroxytrimethylsuccinic acid (AUWERS and CAMPENHAUSEN), A., i, 525; (KOMPPA and BERGROTH), A., i, 598.

Hydroxytrimethylsuccinic anhydride, acetyl derivative of (AUWERS and CAMPENHAUSEN), A., i, 525.

Hydroxytrimethylsuccinotolil and its acetyl derivative (AUWERS and CAMPENHAUSEN), A., i, 525.

p-Hydroxytriphenyltetrazolium chloride and its nitrate (WEDEKIND), A., i, 631.

δ -Hydroxyvaleric acid (FICHTER and HELRAND), A., i, 463.

Hydrozineite from Spain (CESÀRO), A., ii, 479.

Hygric acid, formation of, from euskygrine (LIEBERMANN and CYBULSKI), A., i, 710.

Hygrophilite from Bavaria (SCHWAGER and GÜMBEL), A., ii, 432.

Hyoseine, formula of and physical constants of salts of (HESSE), A., i, 657.

Hyoscyamus niger seed oil, analysis of (MJÖEN), A., ii, 506.

Hypoxanthine, non-occurrence of, in tea extract (KRÜGER), A., i, 450.

I.

Ice, dimorphism of (BARENDRECHT), A., ii, 417.

Ichthyol, estimation of sodium salicylate in (HOFMAN), A., ii, 549.

Idocrase from Vesuvius and the Matterhorn, and wiluite (JANNASCH and WEINGARTEN), A., ii, 259.

Iglesiasite from Silesia (TRAUBE), A., ii, 255.

Ihleite? from Argentina (SCHICKENDANTZ), A., ii, 480.

Ilmenite from Bavaria (SCHWAGER and GÜMBEL), A., ii, 431.

from Queensland (LIVERSIDGE), A., ii, 658.

Ilvaite from Vancouver Island (HOFFMANN), A., ii, 190.

Imides and Imines. Sec:—

Benzoylthiocarbimide.

iso-Butylthiocarbimide.

iso-Butyrylthiocarbimide.

Camphorimide.

Camphorisoimide.

β -Camphormethylisoimide.

Diazobenzenimide.

Dimethylmalonimide.

Diisopropylsuccinyl.

Diisopropylsuccinimide.

Diisopropylsuccino- β -naphthyl.

Diisopropylsuccino-*p*-tolil.

Ethylglutaranil.

Ethylphthalimide.

Ethylsuccinimide.

Formimide.

Glutaranil.

$\beta\beta$ -Glutaranil.

$\beta\beta$ -Glutaro-*p*-tolil.

Hemimellitimide.

Heptylthiocarbimide.

Hydrazimine.

Hydroxynaphthaquinone-4-imide.

2 : 1 : 4-Hydroxynaphthaquinonediimide.

p-Hydroxyphenylsuccinimide.

Hydroxytrimethylsuccinyl.

Hydroxytrimethylsuccinotolil.

Maleinanil.

Maleinimide.

Maleinotolil and Maleino-*p*-tolil.

α -Methylglutaranil.

α -Methylglutaro- β -naphthyl.

α -Methylglutarotolil.

α -Naphthylphthalimide.

Palmitylthiocarbimide.

Phenacetylthiocarbimide.

Propionylthiocarbimide.

Propylthiocarbimide.

Stearylthiocarbimide.

Succinyl and $\alpha\alpha$ -Succinyl.

Succinethylinide.

Succino- α -naphthyl.

Succino- β -naphthyl.

$\alpha\alpha$ -Succino- β -naphthyl.

$\alpha\alpha$ -Succino-*p*-tolil.

Pyrotartarimide.

Pyrotartaronaphthyl.

Tetramethyldiphenylimide.

Tetramethylsuccino- β -naphthyl.

Tetramethylsuccino-*p*-tolil.

Thiethylinide.

Imidocarbonic acid, ethylic salt of (HANTZSCH and MAI), A., i, 34.

phenylic salt of (HANTZSCH and MAI), A., i, 34; (NEF), A., i, 75.

p-bromophenylic salt of (HANTZSCH and MAI), A., i, 33.

phenylic ethylic salt of (NEF), A., i, 75.

- Imidocarbonic acid, bromo-, ethylic salt of (HANTZSCH and MAI), A., i, 34.
 cyano-, ethylic salt of (NEF), A., i, 71, 72.
 Imidoformyl chloride and its compound with hydrogen cyanide (NEF), A., i, 76.
 cyanide (NEF), A., i, 76.
 Imido-oxalic acid. See Oxalic acid, imido-.
 Imidosuccinic acid. See Succinimide.
 Imine, $C_{14}H_{27}N$, from methyleyclohexenonoxime, the nitrate (WALLACH), A., i, 310.
 Iminosulphonic acid. See under Sulphur.
 iso-Indazole, 1'-acetyl derivative of (AUWERS and EWING), A., i, 504.
 Indene, magnetic rotatory power, &c., of (PERKIN), T., 1083, 1144, 1153, 1196, 1197, 1230, 1242.
 Indian geranium, oil of. See *Andropogon schœnanthus*.
 Indican in urine (DAIBER), A., ii, 491.
 presence of, in tumours (NEPVEU), A., ii, 319.
 Indium and gallium in blende from New South Wales (KIRKLAND), A., ii, 183.
 Indigo-carmin, detection of, in wines (BELAR), A., ii, 630.
 Indigoferæ, formation of indigo in plants of the (VAN LOOKEREN and VAN DER VEEN), A., ii, 207.
 Indigotin, formation of, in plants of the *Indigoferæ* (VAN LOOKEREN and VAN DER VEEN), A., ii, 207.
 formation of, from benzylidene-o-nitroacetophenone (ENGLER and DORANT), A., i, 49.
 fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.
 the red isomeride of (SCHUNCK and MARCHLEWSKI), A., i, 96.
 Indileucin, acetyl derivative of (SCHUNCK and MARCHLEWSKI), A., i, 96.
 Indole, presence of, in tumours (NEPVEU), A., ii, 319.
 Indole-2'-carboxylic acid, 1'-amino-, ethylic salt of (REISSERT), A., i, 391.
 1'-nitro- (REISSERT), A., i, 390.
 Indophenazine (SCHUNCK and MARCHLEWSKI), A., i, 96, 236.
 1:3-dibromo-, and its 1'-acetyl derivative (SCHUNCK and MARCHLEWSKI), A., i, 236.
 m-chloro-, and its acetyl compound and silver salt (SCHUNCK and MARCHLEWSKI), A., i, 96.
 Indophenazine, nitro-, and its 1'-acetyl derivative (SCHUNCK and MARCHLEWSKI), A., i, 236.
 Indophenols, absorption spectra of (BAYRAC and CAMICHEL), A., ii, 345.
 Indoxin (REISSERT), A., i, 390.
 Indoxylglycuronic acid in urine (DAIBER), A., ii, 491.
 Induline, discovery of (HOFMANN LECTURE), T., 622.
 Induline (m. p. 286—288°): its acetate, hydrochloride, and hydrobromide (FISCHER and HEPP), A., i, 325.
 Indulines, nomenclature of (JAUBERT), A., i, 326.
 classification of (FISCHER and HEPP), A., i, 51.
 Inesite from Sweden (HAMBERG), A., ii, 308.
 Infusoria, poisonous action of various chemical substances on (BOKORNY), A., ii, 669.
 Intestinal juice, action of, on trehalose, cane sugar, and maltose (BOURQUELOT and GLEY), A., ii, 315.
 characters of, in sheep (PREGL), A., ii, 49.
 paralytic, properties of (MENDEL), A., ii, 617.
 Intestine, absorption of fat by (LEVIN), A., ii, 376.
 absorption of peptone by the (REID), A., ii, 318.
 absorption of proteids from the (FRIEDLÄNDER), A., ii, 536.
 influence of nerves on absorption from the (REID), A., ii, 663.
 small, digestion of lactose in (RÖHMANN and LAPPE), A., ii, 43.
 Inversion, mechanism of (ARMSTRONG), P., 1896, 46.
 of cane sugar by salts (LONG), A., ii, 414.
 Invertebrates, marine, respiratory exchange in (VERNON), A., ii, 195.
 Invertin, action of heat on (ROUSSY), A., ii, 121.
 Inulin, action of oxalic acid on (DÜLL), A., i, 120, 121.
 Inulin of garlic, identity of, with the inulin of hyacinth, narcissus, and tuberoses (CHEVASTELON), A., i, 5.
 Iodargyrite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
 Iodine, occurrence of, in waters (LECCO), A., ii, 579.
 absorption spectrum of solutions of, in carbon bisulphide vapour (WOOD), A., ii, 458.
 rate of sublimation of (ARCTOWSKI), A., ii, 636.

Iodine, partition of, between two solvents (JAKOWKIN), A., ii, 295.
 partition of, between salt solutions and carbon bisulphide and tetrachloride (JAKOWKIN), A., ii, 514.
 presence of, in thymus gland (BAUMANN), A., ii, 487.
 presence of, in the thyroid gland (BAUMANN), A., ii, 263; (BAUMANN and ROOS), A., ii, 487.
 percentage of, in the thyroid gland (BAUMANN), A., ii, 487.
 presence of, in skeleton of Gorgonia (DRECHSEL), A., ii, 378.
 reaction of, with dilute ammonia solution of (CHATTAWAY), T., 1577; P., 1896, 173.
 Hydrogen iodide, preparation of (KASTLE and BULLOCK), A., ii, 357.
 liquid, properties of (NORRIS and COTTRELL), A., ii, 357.
 gaseous, action of, on salts of elements of the fifth group (SMITH and MEYER), A., ii, 165.
 action of carbonyl chloride on (BESSON), A., ii, 358.
 action of sulphuric chloride on (BESSON), A., ii, 417.
 rate of oxidation of (WARDER), A., ii, 297.
 velocity of the reaction between bromic acid and (NOYES and SCOTT), A., ii, 158.
 velocity of the reaction between hydrogen peroxide and (NOYES and SCOTT), A., ii, 158; (HARCOURT and ESSON), A., ii, 238.
 estimation of soluble, volumetrically (RIEGLER), A., ii, 573.
 Iodic acid, action of magnesium on solutions of (VITALI), A., ii, 420.
 compounds of molybdic, tungstic, and phosphoric acids with (CHRÉTIEN), A., ii, 652.
 Iodine, detection of, by dichlorobenzene-sulphonamide (KASTLE), A., ii, 216.
 detection of, in organic compounds (RAIKOW), A., ii, 70.
 detection of small quantities in presence of chlorine and bromine (LUDWIG), A., ii, 542.
 estimation of, electrolytically (VORTMANN), A., ii, 71.
 estimation of, in organic compounds (SCHUYTEN), A., ii, 71.
 Iodo-derivatives. See:—
 Acetone.
 Acetylene.

Iodo-derivatives. See:—
 Aniline.
 Anisidine.
 Anisoil.
 Azobenzenes.
 Azoxybenzene.
 Benzaldehyde.
 Benzsynaldoxime.
 Benzene.
 Benzoic acid.
 Diazobenzenethiophenyl ether.
 2 : 4-Dihydroxyacetophenone.
 β -Ethoxy- β -phenylpropionic acid.
 Ethylene.
 Ethylidencyclopropane.
 Ethylcyclopropane.
 Ethyltrimethylene.
 Formanilide.
 Gorgonic acid.
 Hexahydrotoluene (*methylcyclohexane*).
 Hippenylcarbanil.
p-Hydroxybenzaldehyde.
 Methanedisulphonic acid.
 β -Methoxy- β -phenylpropionic acid.
 Methyl-diphenyl.
 Methylisovaleric acid.
 Naphthalene.
 Pentadecic acid.
 Pentiazoline.
 Phenol.
 β -Phenylhydraacrylic acid.
 β -Phenylpropionic acid.
 Phthalic and *iso*-Phthalic acids.
 Phthalic anhydride.
 Phthalimides.
 Propionic acid.
 Propylene.
iso-Quinoline.
 Terephthalic acid.
 Thienyltriphenylmethane.
 Toluene.
 Tolyketoindene.
 Trimethylpropionic acid.
 Veratrol.
 Xylidine.
 Iodoso-derivatives. See:—
 Benzaldehyde.
 Benzoic acid.
 Iodoxy-derivatives. See:—
 Benzaldehyde.
 Benzene.
 Naphthalene.
 Toluene.
 Iodyrite. See Iodargyrite.
 Ion, atom and molecule, relation between the colours of (LEA), A., ii, 639.
 Ionisation of metals, heat of (JAHN), A., ii, 230, 231.
 Ionisation. See Electrolytic dissociation.
 Ions, connection between the conduc-

- tivity of a vapour for heat and the velocity of its (BREDIG), A., ii, 348.
- Ions, periodicity of the colour of (THOMSEN), A., ii, 16.
- Ipecacuanha, alkaloids of (PAUL and COWNLEY), A., i, 192; (CRIPPS), A., i, 395.
- estimation of (CRIPPS), A., ii, 284.
- Ipecacuanha root, non-existence of cephaeline in one sample of (CRIPPS), A., i, 396.
- Ipomœa turpethum*, turpethin the active constituent of (KROMER), A., i, 386.
- Iresine, red dye of leaves of (WEIGERT), A., i, 388.
- Iridium, solubility of carbon in (MOISSAN), A., ii, 610.
- Iridium bases:—
- Iridioaquopentamine bromide and chloriridite (PALMAER), A., ii, 180, 181.
- Iridiohexamine, hydroxide, chloride, and other salts (PALMAER), A., ii, 181.
- Iridiopentamine bromobromide, chlorochloride, chlorochloriridite, chlorodithionate, chlorhydroxide, chloroxalate, acid chlorosulphate, iodoiodite, nitratonitrite (PALMAER), A., ii, 180, 181.
- Iron, native terrestrial, from Ontario (HOFFMANN), A., ii, 259.
- effect of, on absorption spectra of hæmoglobin and allied compounds (GAMGEE), A., i, 714.
- action of steel on a photographic plate of (PELLAT), A., ii, 601.
- condition of the carbon in (DONATH), A., ii, 563.
- constituents of steel (OSMOND), A., ii, 172.
- absorption of, by living body (WOLTERING), A., ii, 197.
- absorption of, from alimentary canal (GEORGENBURGER), A., ii, 485.
- absorption and excretion of (TIRMANN), A., ii, 487.
- amount of, in food (STOCKMAN), A., ii, 43.
- inorganic, as a source of hæmoglobin (KUNKEL), A., ii, 47.
- storage of, in the liver and spleen (STOCKMAN), A., ii, 438.
- effect of deprivation of, in dogs (STOCKMAN), A., ii, 264.
- compounds containing, in animal and vegetable cells (MACALLUM), A., ii, 317.
- absorption of helium by (TILDEN), A., ii, 656.
- introduction of tungsten and titanium into steel (MOISSAN), A., ii, 602.
- Iron-alloys with antimony, specific gravity and specific heat of (LABORDE), A., ii, 652.
- ferrochromium, analysis of (RIDEAL and ROSENBLUM), A., ii, 276.
- with molybdenum, tungsten, and chromium (BENNEVILLE), A., ii, 174.
- with vanadium (MOISSAN), A., ii, 609.
- Iron amidosulphonates. See Ferrous and Ferric amidosulphonates.
- chlorides. See Ferrous and Ferric chlorides.
- chromium carbides (BENNEVILLE), A., ii, 175.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- magnetic, from Silesia (KOSMANN), A., ii, 431.
- nitrate. See Ferric nitrate.
- nitrosodisulphonate. See Ferric disulphonate.
- nitrososulphides (MARIE and MARQUIS), A., ii, 364.
- oxides, action of carbon dioxide on (BRAITHWAITE), A., ii, 173.
- reduction of, by carbon monoxide (BRAITHWAITE), A., ii, 173.
- oxide. See further Ferric oxide.
- phosphate. See Ferrous phosphates, &c.
- phosphide (GRANGER), A., ii, 651.
- sesquiphosphide (GRANGER), A., ii, 476.
- silicide (MOISSAN), A., ii, 173.
- silicides (CHALMOT), A., ii, 302.
- basic sulphate of, from Queensland (COOKSEY), A., ii, 480.
- sulphates. See Ferrous and Ferric sulphates.
- sulphide, electrochemical preparation of (LORENZ), A., ii, 648.
- compound of, with carbon bisulphide and ammonia (WIEDE and HOFMANN), A., ii, 364.
- pyrites, constitution of (BROWN), A., ii, 108.
- estimation of sulphur in (ASBOTH), A., ii, 71; (KELLER and MAAS; LUNGE), A., ii, 498; (GLADDING), A., ii, 622.
- estimation of pyrrhotite in (CONE), A., ii, 543.
- double sulphide of gold and (MACLAURIN), T., 1274; P., 1896, 149.
- tellurite from Cripple Creek, Colorado (KNIGHT), A., ii, 613.
- Ferric acid, salts of (ROSELL), A., ii, 175.
- Ferric salts, action of, on iodides in aqueous solution (KÜSTER), A., ii, 302.

Iron, Ferric salts, action of magnesium on solutions of (VITALI), A., ii, 420.

Ferric amidosulphonate (DIVERS and HAGA), T., 1647.

chloride, action of light on a solution of oxalic acid and (LEMOINE), A., ii, 285.

velocity of the reaction between stannous chloride and (NOYES and SCOTT), A., ii, 158.

hydrolytic decomposition of (ANTONY and GIGLIO), A., ii, 250.

compounds of, with ammonia (MILLER), A., ii, 26.

hydrated, absorption of moisture by (HAKE), P., 1896, 34.

nitrate, hydrolysis of (ANTONY and GIGLI), A., ii, 604.

hydroxide, action of oxalic acid on (ROSENHEIM), A., i, 280, 348.

nitrosodisulphonate (SABATIER), A., ii, 642.

oxide, solution of ignited (BORN-TRÄGER), A., ii, 502.

influence of, on the reversion of superphosphate (SMETHAM), A., ii, 364.

sulphate, hydrolysis of (ANTONY and GIGLI), A., ii, 604.

Ferrous amidosulphonates (DIVERS and HAGA), T., 1647.

chloride, compounds of, with ammonia (MILLER), A., ii, 27.

compounds of, with nitric oxide (THOMAS), A., ii, 26.

sodium triphosphate (STANGE), A., ii, 643.

thiopyrophosphate (FERRAND), A., ii, 473.

thiophosphite (FERRAND), A., ii, 418.

sulphate, solubility of isomorphous mixtures of copper sulphate and (STORTENBEKER), A., ii, 14.

aluminium sulphate, occurrence of, on bricks exposed to sulphurous anhydride (PATERSON), T., 66; P., 1895, 203.

cæsium sulphate, density and optical behaviour of (TUTTON), T., 396.

potassium sulphate, density and optical behaviour of (TUTTON), T., 387.

rubidium sulphate, density and optical behaviour of (TUTTON), T., 391.

Iron ore from Servia (LOZANIĆ), A., ii, 252.

Iron ores, estimation of arsenic in (STEAD), A., ii, 390.

estimation of manganese in (MIXER and DU BOIS), A., ii, 547.

estimation of phosphorus in, in presence of titanium (PATTINSON and PATTINSON), A., ii, 389.

Iron, detection and estimation of:—

autopneumatic stirrer for copper ammonium chloride treatment in steel analysis, (BREARLEY), A., ii, 71.

detection of, microchemically (SCHRÖDER VAN DER KOLK), A., ii, 574.

estimation of, colorimetrically (LUNGE), A., ii, 392.

estimation of, electrolytically (NICHOLSON and AVERY), A., ii, 627.

estimation of, in ores (WELLS and MITCHELL), A., ii, 502.

estimation of, in aluminium (MOISSAN), A., ii, 339.

estimation of arsenic in pig iron, (STEAD), A., ii, 390.

estimation of arsenic in steel (STEAD), A., ii, 390.

estimation of carbon in (PEIPERS), A., ii, 449.

estimation of carbon in steel (BLAIR), A., ii, 544.

estimation of graphite in pig iron (SHIMER), A., ii, 499.

estimation of manganese in steel, errors in (AUCHY), A., ii, 627.

estimation of nickel in steel (BREARLEY), A., ii, 676.

estimation of phosphorus in, in presence of titanium (PATTINSON and PATTINSON), A., ii, 389.

estimation of sulphur in, apparatus for (READ), A., ii, 274.

estimation of sulphur in pig iron (AUCHY), A., ii, 543; (BOUCHER), A., ii, 671.

estimation of sulphur in white cast iron (PHILLIPS), A., ii, 498.

estimation of sulphur in steel (BOUCHER), A., ii, 671.

separation of, qualitatively from chromium (GIACOMELLI), A., ii, 128.

separation of, qualitatively, from nickel, chromium, cobalt, manganese, aluminium, and zinc (HARE), A., ii, 127.

separation of arsenic from (JANNASCH and KAMMERER), A., ii, 221.

separation of, from beryllium (ATKINSON and SMITH), A., ii, 220.

Iron, separation of chromium from (JANNASCH and VON CLOEDT), A., ii, 222.

separation of nickel from (BREARLEY), A., ii, 676.

Isanic acid (HÉBERT), A., i, 638.

action of bromine and of oxygen on (HÉBERT), A., i, 638, 639.

I'Sano seeds, fatty acids from (HÉBERT), A., i, 638.

Isatin, condensation of, with *o*-phenylenediamine (SCHUNCK and MARCHLEWSKI), A., i, 96.

action of nitrous acid on (HOFMANN LECTURE), T., 699.

nitration of (HOFMANN LECTURE), T., 647.

Isatin, *m*-chloro-, condensation of, with *o*-phenylenediamine (SCHUNCK and MARCHLEWSKI), A., i, 96.

Isatinacetylphenylmethylhydrazone (SCHUNCK and MARCHLEWSKI), A., i, 96.

Isatin- β -naphthylhydrazone (SCHUNCK and MARCHLEWSKI), A., i, 96.

Isatinphenylmethylhydrazone (SCHUNCK and MARCHLEWSKI), A., i, 96.

Isatinsemicarbazone (MARCHLEWSKI), A., i, 449.

p-chlor- (MARCHLEWSKI), A., i, 449.

nitro- (MARCHLEWSKI), A., i, 449.

Isatohydrophenazine. See Indophenazine.

Isomerides, optically active and inactive, molecular weights of (TRAUBE), A., i, 526.

optical, physical properties of (WALDEN), A., ii, 553.

Isomerism, position, influence of, on optical activity (FRANKLAND and WHARTON), T., 1583; P., 1896, 186.

effect of, on rotatory power (FRANKLAND and WHARTON), T., 1320; P., 1896, 148.

isomorphous mixtures, solubility of (STORTENBEKER), A., ii, 13.

isonitriles, alkylic, preparation of (HOFMANN LECTURE), T., 663.

isophthalic acid. See Phthalic acids.

isaconic acid, sublimation temperature under small pressure of (KRAFFT and DYES), A., ii, 89.

amylic salt, rotatory power of (WALDEN), A., ii, 633.

ethylic salt, action of alcoholic ammonia on (KÖRNER and MENOZZI), A., i, 205.

J.

Jadeite from Burma (FARRINGTON), A., ii, 311; (BAUER), A., ii, 311.

from "Tibet" (BAUER), A., ii, 310.

Jalap resin, estimation of (SPAETH), A., ii, 508.

Jalapic acid and salts (KROMER), A., i, 385.

Jalapin, identity of, with scammonin, and properties of (KROMER), A., i, 385.

Jalapinolic acid (KROMER), A., i, 386.

Jams, estimation of glucose in (MAYRHOFER), A., ii, 225.

Jecorin in the liver of the dolphin (DRECHSEL), A., ii, 378.

Johnstonite from Broken Hill, N.S.W. (SMITH), A., ii, 30.

Juglans regia, proteids of (OSBORNE and CAMPBELL), A., i, 716.

Juices, composition of pure fruit (KREMLA), A., ii, 62.

K.

Kadsura japonica, occurrence of galactan and araban in (YOSHIMURA), A., ii, 60.

Kainite, effect of, on yield and composition of grass (MÄRCKER), A., ii, 271.

Kaliborite, formula of (KOSMANN), A., ii, 368.

Kaolin after malachite from Russia (JEREMÉEFF), A., ii, 566.

Kauaiite from Hawaii (GOLDSMITH), A., ii, 35.

Kentrolite from Jakobsberg, Sweden (NORDENSIÖLD), A., ii, 257.

from Långban, Sweden (FLINK), A., ii, 186.

Keratophyre, quartz-, from Wisconsin (WEIDMANN), A., ii, 314.

Kermes berries, compound obtained from, and its acetyl and benzoyl derivatives (HILGER and MAI), A., i, 496.

Kermesite (BAUBIGNY), A., ii, 31.

Ketazines (CURTIUS), A., i, 339.

iso-Ketocamphoric acid from oxidation of pinonic and α -pinonic acids (TIE-MANN and SEMMLER), A., i, 309.

Ketodihydrophenotriazine-4'-oxime and its hydrochloride (PINNOW and SÄMANN), A., i, 366.

Ketoglycol, $C_{10}H_{18}O_3$, from dihydrocarvone: its oxime and semicarbazone (WALLACH), A., i, 102.

Ketohexamethylenecarboxylic acids. See *cyclo*-Hexanonecarboxylic acids.

Ketohydrazones (CURTIUS), A., i, 339.
 Ketoketoximebehenic acid (SPIECKER-MANN), A., i, 410.
 Ketone obtained by oxidation of bromisoanethoil; and its compounds with ammonia and with potassium acetate (HELL and GAAB), A., i, 293.
 obtained by reduction of secondary nitrodiisoamyls (KONOWALOFF and NIKITIN), A., i, 673.
 from the ketoglycol derived from dihydrocarvone and its semicarbazone (WALLACH), A., i, 102.
 Ketone, $C_8H_{14}O$, derived from dihydrociscampholytamide (NOYES), A., i, 696.
 $C_9H_{14}O_2$, from dihydrocarvone: its oxime and semicarbazone (WALLACH), A., i, 102.
 $C_9H_{16}O$, from oxidation product of pulegenie acid, and its carbazone, and oxime (WALLACH), A., i, 311.
 $C_{10}H_9O_2Br_3$, from dibromanethoil dibromide. See Anethoil dibromide.
 $C_{10}H_{10}O_2Br_2$, from bromanethoil dibromide, and its aniline derivative (HELL and GÜNTHERT), A., i, 20.
 $C_{10}H_{10}O_3$, from isosafrole, and its oxime (WALLACH and POND), A., i, 95.
 $C_{10}H_{11}O_2Br$, from anethoil dibromide, and its ammonia derivative (HELL and GÜNTHERT), A., i, 21.
 $C_{10}H_{14}O_4$, from *iso*-amylacetylacetone and its sodium hydroxide (BARBIER and BOUVEAULT), A., i, 638.
 $C_{10}H_{16}O$, from pinole tribromide: its oxime and semicarbazone (WALLACH), A., i, 102.
 $C_{10}H_{16}O$, from methyleyclohexenone and acetone (WALLACH), A., i, 572.
 $C_{10}H_{18}O$, from phellandrene nitrite: its *d*-oxime and semicarbazone (WALLACH and HERBIG), A., i, 101.
 $C_{12}H_{16}O_3$, from methylisoeugenol, and its oxime and semicarbazone (WALLACH and POND), A., i, 95.
 $C_{14}H_{22}O$, from methyleyclohexenone: its hydrochloride, hydrobromide, and oxime (WALLACH), A., i, 572.
 $C_{17}H_{16}O$, formed by condensation of cinnamylideneacetone with benzaldehyde (SCHOLTZ), A., i, 368.
 Ketone-alcohol, $C_{10}H_{18}O_2$, from the oxidation of menthene (TOLLOZKO), A., i, 381.

Ketone-group of natural dye stuffs (PERKIN), T., 1410; P., 1896, 167.
 Ketones from isoeugenol ethyl and methyl ether dibromides (HELL), A., i, 169.
 formation of, by union of water with acetylene hydrocarbons (DESGREZ), A., i, 2.
 ortho-, action of hydrazine on (CURTIUS), A., i, 339.
 action of zinc and ethylic chloracetate on (REFORMATSKY), A., i, 128.
 reduction of, by aluminium (WISLICENUS), A., i, 672.
 bromo-, from anethoil dibromide and bromanethoil dibromide (HELL), A., i, 170.
 Ketones and Quinones. See also :—
 Acenaphthenone.
 Acetomesitylene.
 Acetone.
 Acetonyl-*o*-benzoicsulphinide.
 Acetophenone.
 Acetophenone, cyano-.
 Acetylacetone.
 Acetylbenzyl methyl ketone.
 Acetylbisnitrosodimethylnaphthalene.
 Acetyldihydrodiduroquinone.
 Acetyldihydroxydimethylnaphthalene.
 Acetyldihydroxyflavone.
 Acetyldiduroquinone.
 Acetyldurene and Acetylisodurene.
 Acetylhydroxyquinolinequinone.
 Acetylmesitylene.
 Acetylpentamethylbenzene.
 Acetylphorone.
 Acetylisopropylketopentamethylene.
 Adipinketone.
 Anhydroglycopyrogallol.
 Anhydroglycoresorcinol.
 Anilidotoluquinone.
 Anisic acetone.
 Anisyl ethyl ketone.
 Anthraquinone.
 Azoxyphenyl-*p*-tolyl ketone.
 Benzophenone.
 Benzopinacolin.
 Benzoylbenzoylacetomethane.
 Benzocyclooumarone.
 Benzoyldiacetylmethane.
 Benzoyldiduroquinone.
 Benzoylmesitylene.
 Benzoyl-3-methyl-5-isobutyl- Δ_2 -cyclohexenone.
 Benzoyl-3-methyl-5-hexyl- Δ_2 -cyclohexenone.
 Benzoylmethylic phenylic ether.
 Benzoylmethylresoreinol.
 Benzoylvanillin.
 Benzoylveratrole.

Ketones and Quinones. See:—

Benzyl methyl ketone.
 Benzyldesmotroposantonin.
 1' : 3'-Benzylethylphthalazone.
 Benzylideneacenaphthenone.
 Benzylideneacetone.
 Benzylideneacetophenone.
 Benzylideneanhydroglycogallol.
 Benzylidenediacetophenone.
 Benzylidene-eucarvone.
 Benzylidenementhone.
 Benzyldenemethylhexenone.
 Benzyldenemethylketoisooxalone.
 Benzylidene*cyclopentanones*.
 Benzyldenepulegone.
 Benzyldenetriacetophenone.
 1' : 3'-Benzylmethylphthalazone.
 Benzylrosindone.
 1'-*iso*-Butylphthalazone.
 Camphenone.
 Camphor.
 Camphorone.
 Campherquinone.
 Chloranil.
 Chrysoketone.
 Coumarone.
 Cymophenone and *p*-Cymoquinone.
 Desylacetophenone.
 Diacenaphthylidenone.
 Diacetophenone.
 Diacetyl dicyanide.
 Diacetylacetone.
 Diacetyldianthranol.
 Diacetyldurene.
 Diacetyl*isodurene*.
 Diacetylmesitylene.
 Diacetylresacetophenone.
 Diallylacetone.
 Diisoamylaminoacetone.
 Diamyloxyquinone.
 Dianilidotoluquinone.
 Dianisylidenecyclopentanone.
 Diazoacetophenone.
 Diazopiperonylacetone.
 α - and β -Dibenzoylacetylmethanes.
 Dibenzoylbisphenylenemethylpyrazolone.
 Dibenzoylmesitylene.
 Dibenzoylphenylmethane.
 Dibenzylidenecyclohexanone.
 Dibenzylidenemethylhexenone.
 Dibenzylidenemethylpentenone.
 Dibenzylidenesuberone.
 Dibenzylidenetriacetophenone.
 Dibenzylloxyquinone.
 Diisobutylaminoacetone.
 Diisobutyl ketone.
 Dibutyryl.
 Dieinamylidenecyclopentanone.
 Diduroquinone.
 3 : 3-Diethoxybenzophenone.

Ketones and Quinones. See:—

Diethoxybenzylidenetriacetophenone.
 3 : 3-Diethoxy-4 : 4-dimethylbenzophenone.
 Diethyl diketone.
 Diethyl ketone.
 Difurfurylidenecyclohexanone.
 Difurfurylidenecyclopentanone.
 Difurfurylidenetriacetophenone.
 Dihydrohippuroflavin.
 Dihydroxyacetophenone.
 Dihydroxybenzophenone.
 Dihydroxyflavone.
 Dihydroxy- β -naphthaquinone.
 Diketone from quercitol.
 Diketopiperazine.
 Dimesityldinitrosacyl.
 3 : 3-Dimethoxybenzophenone.
 Dimethyl ketone.
 Dimethylacetylacetone.
 Dimethylaminoacetone.
 Dimethylbenzoylpropionic acid.
 2 : 5-Dimethylhexan-3-ol-4-one.
 1 : 3-Dimethylcyclohexanone.
 Dimethylnaphthol.
 1 : 3-Dimethylcyclopentanone.
 Diphenacyl.
 Diphenacyl ethylene diketone.
 Diphenoxyquinone.
 Diphenylacetophenone.
 Diphenyldimethyltetrahydro- γ -pyrone.
 Diphenyldiphenylenepinacolin.
 Diphenylene ketones.
 4 : 5-Diphenyl-2 : 7-octanedione.
 Diphenyloxetone.
 Diphenylcyclopentenone.
 1 : 3-Diphenylisotetrazolone.
 Dipiperonaltriaacetophenone.
 Dipropionyl.
 Dipropionylidurene.
 Dipropionylmesitylene.
 4 : 4-Dipropoxybenzophenone.
 Dipropyl ketone.
 Diisopropyl ketone.
 Dipropylaminoacetone.
 Di-*p*-tolyl benzylidenedimethyl diketone.
 Di-*p*-tolyl furfurylidenedimethyl diketone.
 Diisovaleryl.
 Duroquinone.
 Ethoxybenzylideneacetone.
 Ethoxybenzylideneacetophenone.
 2 : 5-Ethoxyphenyl-3 : 4-dithiobiazolone.
 Ethyl *iso*-propyl ketone.
 Ethylbenzoylpropionic acid.
 Fenchone.
 Furfurylideneacetophenones.
 Gallacetophenone.

Ketones and Quinones. See:—

cyclo-Hexanone-1-carboxylic acid.
 Hippuroflavin.
 Hydracetylacetone.
 Hydrindone.
 Hydrolapaehol.
o- and *p*-Hydroxybenzophenones.
 Hydroxybenzylideneacetophenone.
 Hydroxydihydroearvone.
 Hydroxydimethoxyeoumarinearboxylic acid.
 1-Hydroxy-1 : 2-diphenylcyclopentan-4-one.
 Hydroxyhydrolapaehol.
 Hydroxyisolapaehol.
 Hydroxylapaehone.
 β -Hydroxy- α -naphthaquinone.
p-Hydroxyphenyl *p*-tolyl ketone.
 Hydroxyphenylethyl propyl ketone.
 Hydroxystyryl propyl ketone.
 α -Keto- β -pentene.
 Ketopiperazine.
 Lapaehol.
 Lapaehone.
 Menthone.
 Mesityl methyl ketone.
 Mesitylic oxide.
o-Methoxybenzophenone.
 Methoxyphenyl ethyl ketone.
 Methoxyphenylketotetrahydroquinazoline.
 Methyl benzamidobutyl ketone.
 Methyl butyl ketone.
 Methyl *iso*-butyl ketone.
 Methyl *sec*-isobutyl ketone.
 Methyl ethyl ketone.
 Methyl hexyl ketone.
 Methyl hydroxyethyl ketone.
 Methyl propenyl ketone.
 Methyl propyl ketone.
 Methyl *isopropyl* ketone.
 Methyl propylidenethyl ketone.
 Methylamylaminoacetone.
 Methylbenzoylpropionic acid.
 Methylbutylaminoacetone.
 1-Methyl-3-*isobutyl*cyclohexanone.
 3 : 5-Methylisobutyl- Δ_2 -cyclohexenone.
 Methylisobutyrylketopentamethylene.
 Methylheptenone.
 1-Methylcyclohexanone.
 Methylcyclohexenone.
 3-Methyl-5-hexyl- Δ_2 -cyclohexenone.
 β -Methylketopentamethylene.
 Methylketoisoxalone.
 1-Methyl-3-*isopropyl*cyclohexanone.
 3-Methyl-5-*isopropyl*- Δ_2 -cyclohexenone.
 Naphthaquinonecarboxylic acid.
 Nopinone.
 Peonol.

Ketones and Quinones. See:—

Phenacyl bromide.
 Phenacyl-*o*-benzoisulphinide.
 Phenetylketotetrahydroquinazoline.
 Phenyl α -coumaryl ketone.
 Phenyl *m*-ethoxystyryl ketone.
 Phenyl ethyl ketone.
 Phenyl hydroxystyryl ketones.
 Phenyl styryl ketone.
 Phenyl tolyl ketones.
 Phenyl *p*-tolyl phenylene diketone.
 Phenyl *m*-xylol ketone.
 Phenyl *o*-xylol ketone.
 Phenyl *p*-xylol ketone.
 Phenylacetone (*benzyl methyl ketone*).
 5-Phenyl-3 : 4-dithiobiazolone.
 Phenylketotetrahydroquinazoline.
 Phenylmethylketotetrahydropyridazinecarboxylic acid.
 Phenylpropyltetrahydroazindone.
 4-Phenylquinazolone.
 4'-Phenyltetrahydroquinazolone.
iso-Phorone.
 Pinaeolin.
 Piperonalacetophenone.
 Piperonylacetone.
 Propionyl durene.
 Propionylmesitylene.
iso-Propylbenzoquinone.
iso-Propylbenzoylpropionic acid.
iso-Propylfurfuran-naphthaquinone.
iso-Propylheptanonic acid.
 1'-Propylphthalazone.
 Pulegone.
 Resacetophenone.
 Styryl methyl ketone.
 Tetracetylene.
 Tetrahydroacetophenone.
 1- β -Tetranaphthyl-3-cyanotrimethylpiperidone.
 Tetraphenylquinone.
 Tetraphenylene-pinaeolin.
o- and *m*-Toluidotoluquinones.
 Toluquinone.
p-Tolyl α -coumaryl ketone.
p-Tolyl furfurylidenemethyl ketone.
p-Tolyl *o*-hydroxystyryl ketone.
p-Tolyl styryl ketone.
 Tolylketoindene.
 Tribenzoylmethane.
 Trihydroxybenzophenone.
 Trihydroxyxanthone.
 Trimethoxycoumarin.
 Trimethoxyeoumarincarboxylic acid.
 1' : 3' : 3'-Trimethyl-2'-indolinone.
 Trimethylketohexamethylene.
 Tri-*p*-tolylidibenzylidenetrimethyltri-ketone.
 Tropinone.
 Tropinonecyanhydrin.
iso-Valerophenone-*o*-carboxylic acid.

Ketones and Quinones. See:—

Xanthone.

m-Xyloquinone.

p-Xylyl ketone.

Ketonic acids, ethereal salts of, action of hydrazine on (CURTIUS), A., i, 339.

α -Keto- β -pentene, *hexachloro*-, reversible conversion of, into *hexachloro*- α -keto- γ -pentene (KÜSTER), A., ii, 158.

Ketopinic acid, its methylie, barium, and calcium salts, hydrazone, and oxime (ARMSTRONG), P., 1896, 167; T., 1401.

$\alpha\gamma$ -Ketopyrhydrindenecarboxylic acid, β -*dichloro*-, and its methylie salt (ZINCKE and WINZHEIMER), A., i, 500.

Ketostearamide, hydrolysis of (BEHREND), A., i, 410.

Ketostearic acid (BEHREND), A., i, 410. bromo- (BEHREND), A., i, 410.

*chl*oro-, reduction of (BEHREND), A., i, 410.

oxime of (BEHREND), A., i, 410.

Ketoterpine from hydroxycarone (VON BAEYER), A., i, 246.

Kidney, causes of secretion by the (TAMANN), A., ii, 618.

Kinoin, non-formation of acid compounds of (PERKIN), T., 1440; P., 1896, 167.

Kjeldahl's method, estimation of platinochlorides by (VAN DAM), A., ii, 218.

Klinozoisite from the Tyrol (WEINSCHEK), A., ii, 569.

Knaresborough dropping well, analysis of water of (BURRELL), T., 536; P., 1896, 73.

Knopite from Alnö, Sweden (HOLMQUIST), A., ii, 313.

Kola nut, amount of caffeine and theobromine in (LE BON), A., ii, 64.

Koprosterol, separation of, from human faeces (BONDZYŃSKI), A., ii, 313.

Koridofu, a preparation of tofu (INOUE), A., ii, 65.

Kyanite, action of boric acid on (JANNASCH), A., ii, 576.

Kyano!." See Aniline.

L.

Labradorite from the Azores (FOUQUÉ), A., ii, 532.

from Bavaria (SCHWAGER and GÜMBEL), A., ii, 432.

from New Zealand (SPEIGHT), A., ii, 192.

Labradorite-bytownite from the Azores and France (FOUQUÉ), A., ii, 532.

Laccase in germinating seeds (REY-PAILHADE), A., ii, 326.

detection of, in vegetables (BERTRAND), A., ii, 61.

in fungi (BOURQUELOT and BERTRAND), A., ii, 268.

Lactase of the small intestine (RÖHMANN and LAPPE), A., ii, 43.

absence of, in intestinal juice of sheep (PREGL), A., ii, 49.

Lactic acid, crystallised, of constant boiling point (KRAFFT and DYES), A., i, 84.

sodium salt, electrolysis of (WALKER), T., 1278.

Lactic acid, *trichloro*- (ZAHARIA), A., i, 634.

d-Lactic acid, conversion of, into *lævo*-lactic acid (PURDIE and WILLIAMSON), T., 837; P., 1896, 97.

specific rotation of the ethylie salt of (PURDIE and WILLIAMSON), T., 827; P., 1896, 97.

Lactic acids, *lævo*- and inactive, rotatory powers of the *lævo*- and inactive amylic salts of (WALDEN), A., ii, 139.

Lactic fermentation, action of metallic salts on (CHASSEVANT), A., ii, 122.

Lactic nitrile, action of acetic chloride on (COLSON), A., i, 283, 284.

Lactide, refraction equivalent of (ANDERLINI), A., ii, 229.

Lactone, $C_8H_{14}O_2$ (REFORMATSKY), A., i, 129.

$C_{10}H_{14}O_2$, derived from *isobutaldehyde* (FRANKE), A., i, 404.

$C_{10}H_{14}O_3$, from dibromocampholide, and its bromo-derivative (FORSTER), T., 43; P., 1895, 208.

$C_{26}H_{46}O_2$, from acid, $C_{26}H_{48}O_3$ (KLINGER and LONNES), A., i, 691.

unsaturated, from ceruleonitrosocampholenolide (BÉHAR and BLAISE), A., i, 56.

Lactone formation in acids of the sugar group, velocity of (HJELT), A., i, 596.

Lactones. See also:—

Anilido- α -methylbutyrolactone.

Butyrolactone.

Camphenesulphonic acid.

Campholenolide.

Campholide.

Dihydroxytetraphenylethanedicarboxylic acid, dilactone of.

2:6-Dimethyloctan-3-olonic acid, lactone of.

Diphenyldibutyrolactone.

Ethylvalerolactone.

Galactonic acid, lactone of.

iso-Heptenolactone.

Lactones. See:—

- iso*-Hexolactone (*iso-caprolactone*).
- γ -*iso*-Hexolactone.
- Homoterpenoylformic acid.
- Homoterpenylic acid.
- δ -Hydroxybutane- $\alpha\gamma\delta$ -tricarboxylic acid, lactone of.
- ω -Hydroxycamphotricarboxylic acid, lactone of.
- Hydroxydibromocamphorsulphonic acid, lactone of.
- 2-Hydroxy-2:3-diphenylcyclopentenonylacetic acid, β -lactone of.
- Hydroxylactone, $C_{10}H_{16}O_3$.
- Hydroxymethylcoumalin.
- β -Hydroxymethylpicolinic acid, lactone of.
- β -Hydroxy- $\alpha\alpha\beta$ -trimethyladipic acid, lactone of.
- Hydroxytrimethylglutaric lactone.
- Lanoceric acid, lactone of.
- Lyxonolactone.
- Methoethylheptanonolide.
- Methylbutyrolactone.
- p*-Methylcarbocaprolactonic acid.
- Octolactone: α -Propylvalerolactone.
- Opianic acid ethylanilic lactone.
- Opianic acid naphthylamic lactones.
- Opianic acid tetrahydroquinaldinic lactone.
- Opianic acid tetrahydroquinolinic lactone.
- Phthalaldehydic acid tetrahydroquinolinic lactone.
- Propylvalerolactone.
- iso*-Propylvalerolactone.
- iso*-Rhammonic acid, lactone of.
- 2:4:2':4'-Tetrahydroxydiphenylacetic acid, lactone of.
- γ -Valerolactone.
- Valerolactone. See α -Methylbutyrolactone.
- Vinylpicolinic acid, β -dichloroxy-, lactone of.
- Lactonic acid, $C_4H_2O_5$, from dihydroxymaleic acid and hydrogen bromide in presence of acetic acid (FENTON), T., 559.
- Lactose (*milk sugar*), action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
- action of methyl alcoholic ammonia on (DE BRUYN and VAN LEENT), A., i, 119.
- action of oxalic acid on (KIERMAYER), A., i, 145.
- α -allylhydrazone, α -amylhydrazone, α -benzylhydrazone, α -ethylhydrazone, and naphthylhydrazone of (VAN EKENSTEIN and DE BRUYN), A., i, 588.

- Lactose, digestion of, in the small intestine (RÖHMANN and LAPPE), A., ii, 43.
- in the urine after child-birth (LEMAIRE), A., ii, 490.
- reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 152; P., 1896, 9.
- estimation of, by Fehling's solution (KJELDAHL), A., ii, 581.
- estimation of, in milk (RAUMER and SPAETH), A., ii, 394.
- estimation of, in milk by polarisation (WILEY and EWELL), A., ii, 628.
- Lactoscaminoguanidine nitrate and sulphate (WOLFF), A., i, 78, 79.
- Lactose-ammonia (DE BRUYN and VAN LEENT), A., i, 119.
- β -Lactylcarbamide, action of hydrochloric acid and caustic soda on (WEIDEL and ROITHNER), A., i, 470.
- and its monacetyl derivative (WEIDEL and ROITHNER), A., i, 470.
- Lactylglycollic acid, thio- (*acetic-thiopropionic acid*) (LOVÉN), A., i, 413.
- Lactylhydraacrylic acid, thio-. See Di-propionic acid, thio-.
- β -Lactylphenylhydrazide (DE VRIES), A., i, 94.
- Lactyltropine (MERCK), A., i, 65.
- Lamprite group of minerals, microchemical reactions of (LEMBERG), A., ii, 430.
- Långbanite from Sjö mine, Sweden (SJÖGREN), A., ii, 113.
- Lanoceric acid from wool fat (DARMSTAEDTER and LIFSCHÜTZ), A., i, 522.
- action of alcohol and hydrochloric acid on (DARMSTAEDTER and LIFSCHÜTZ), A., i, 522.
- lactone of (DARMSTAEDTER and LIFSCHÜTZ), A., i, 522.
- Lanolinic alcohol, homologues of (DARMSTAEDTER and LIFSCHÜTZ), A., i, 198.
- Lanthanum carbide (PETTERSSON), A., ii, 25; (MOISSAN), A., ii, 650.
- niobate (LARSSON), A., ii, 564.
- oxide, new source of (PHIPSON), A., ii, 422.
- colloidal solution of (DELAFONTAINE), A., ii, 562.
- tungstate (HITCHCOCK), A., ii, 526.
- Lanthanum, separation of thorium from (FRESENIUS and HINTZ), A., ii, 677.
- α -Lapachan, preparation of (HOOKER), T., 1365.
- β -Lapachan, preparation of, and its pierate (HOOKER), T., 1365.

- Lapachol, constitution of (HOOKER), T., 1355; P., 1896, 166.
- iso-β*-Lapachol, constitution of (HOOKER), T., 1357, 1363.
- synthesis of, and its acetate (HOOKER), T., 1362.
- bromide (HOOKER), T., 1360, 1379.
- Lapachone (HOOKER), T., 1361.
- α*-Lapachone, reduction of (HOOKER), T., 1366.
- β*-Lapachone, reduction of (HOOKER), T., 1367.
- bromo- (HOOKER), T., 1361.
- iso*-Lapachone (HOOKER), T., 1362.
- Lard, estimation of acetyl numbers of (SPAETH), A., ii, 454.
- iodine number of (ITALIE), A., ii, 344.
- detection of vegetable oils in (JEAN), A., ii, 455.
- detection of cotton-seed oil, &c., in (SCHWEITZER and LUNGWITZ), A., ii, 399; (DUPONT), A., ii, 485.
- analysis of (GOSKE), A., ii, 82; (WESSON), A., ii, 228; (SCHWEITZER and LUNGWITZ), A., ii, 399; (VOGEL), A., ii, 455.
- lard oil, analysis of (SCHWEITZER and LUNGWITZ), A., ii, 399.
- latent heat of evaporation, fusion, &c. See Heat.
- laumontite from the Caucasus (ZEM-JATSCHENSKY), A., ii, 369.
- from Dresden (ZSCHAU), A., ii, 189.
- lauric acid, behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.
- lauroleone from potassium alloethylic camphorate (WALKER and HENDERSON), T., 750; P., 1896, 110.
- from camphanic acid (ASCHAN), A., i, 447.
- auronic acid, cyano-, silver, methylic, and ethylic salts (HOOGWERFF and VAN DORP), A., i, 314.
- auronolic acid from camphanic acid (ASCHAN), A., i, 447.
- constitution of (WALKER and HENDERSON), T., 758.
- autite from Saxony (FRENZEL), A., ii, 111.
- awsonite from California (RANSOME and PALACHE), A., ii, 370.
- azulite, formula of (RAMMELSBURG), A., ii, 190.
- lead, specific heat of (BARTOLI and STRACCIATI), A., ii, 145.
- rate of diffusion of, in mercury (HUMPHREYS), T., 250; P., 1896, 9.
- rate of diffusion of, through tin (ROBERTS-AUSTEN), A., ii, 592.
- action of, on lead nitrate (SENDERENS), A., ii, 106; (KIPPENBERGER), A., ii, 522.
- Lead, desilverisation of, by electrolysis (TOMMASI), A., ii, 603.
- Lead alloys with tin and cadmium, solution and diffusion of, in mercury (HUMPHREYS), T., 1681; P., 1896, 220.
- Lead amalgam, thermoelectromotive force of solutions of lead salts and (HAGENBACH), A., ii, 513.
- Lead salts, influence of organic hydroxy-compounds on the precipitation of (KAHLENBERG), A., ii, 7.
- list of quadrivalent (HUTCHINSON and POLLARD), T., 225.
- Lead chloride, fused, electrolysis of (LORENZ), A., ii, 23.
- tetrachloride (HUTCHINSON and POLLARD), T., 218.
- chromate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- imidosulphonates (DIVERS and HAGA), T., 1626.
- iodide, non-existence of various double salts of alkali haloids with (HERTY), A., ii, 474.
- sulphiodide (LENHER), A., ii, 523.
- nitrate, electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
- thermal expansion of solutions of (DE LANNOY), A., ii, 233.
- freezing points of aqueous solutions of (PONSOT), A., ii, 412.
- action of lead on (PETERS), A., ii, 300.
- action of potassium nitrite on (PETERS), A., ii, 300.
- Lead oxides:—
- red lead, action of glacial acetic acid on (HUTCHINSON and POLLARD), T., 213; P., 1896, 31.
- peroxide electrodes in galvanic cells (TOWER), A., ii, 142.
- dioxide, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- Lead tetraphosphate (HUTCHINSON and POLLARD), T., 221; P., 1896, 31.
- thiopyrophosphate (FERRAND), A., ii, 473.
- sodium triphosphate pyrophosphate (STANGE), A., ii, 644.
- sulphide, electrochemical preparation of (LORENZ), A., ii, 648.
- physical change produced by gently heating (SPRING), A., ii, 290.

- Lead sulphide, action of a high temperature on (MOURLOT), A., ii, 603.
 double sulphide of gold with (MACLAURIN), T., 1273; P., 1896, 149.
 sulphocarbonate from Broken Hill, N.S.W. (HAMMOND), A., ii, 256.
- Lead, detection of, microchemically (TRAUBE), A., ii, 578.
 detection of, in waters (EGELING), A., ii, 549.
 detection of arsenic in, when tin is present (DE KONINGH), A., ii, 273.
 estimation of, volumetrically (CUSHMANN and HAYES-CAMPBELL), A., ii, 219; (BEEBE), A., ii, 275; (LONGI and BONAVIA), A., ii, 626.
 estimation of, in alloys with tin, antimony, and arsenic (ANDREWS), A., ii, 501.
 estimation of, in galena (ECKENROTH), A., ii, 501.
 estimation of, when present in small quantities in water (ANTONY and BENELLI), A., ii, 549.
 separation from barium, calcium, antimony, arsenic, iron, copper, and zinc (BEEBE), A., ii, 275.
- Leadhillite pseudomorphs from Missouri (FOOTE), A., ii, 35.
- Leather, estimation of sulphuric acid in (BALLAND and MALJEAN), A., ii, 499.
- Leaves, colouring matter of autumn (STAATS), A., i, 181.
- Lecithin, amount of, in nodules and leaves (STOKLASA), A., ii, 205.
 assimilation of, by plants (STOKLASA), A., ii, 266.
 storage of, in the liver (NOËL-PATON), A., ii, 316.
- Lecture experiment: volumetric composition of ammonium chloride vapour (CARNEGIE and WALES), A., ii, 558
 electrolysis of hydrochloric acid (HIGLEY and HOWARD; PICKEL), A., ii, 557.
 combustion of oxygen in ammonia (OSSIPOFF), A., ii, 356.
 with ozone, apparatus for (NEWTN), T., 1298; P., 1896, 139.
 volumetric composition of water vapour (FREER), A., ii, 558.
- Lectures, memorial: Helmholtz (FITZGERALD), T., 885; P., 1896, 26.
 Hofmann (ABEL, ARMSTRONG, PERKIN, PLAYFAIR), T., 575; P., 1893, 133.
- Lothar Meyer (BEDSON), T., 1403; P., 1896, 119.
- Ledene and its hydrochloride (HJELT), A., ii, 249.
- Ledum palustre*, oil from (HJELT), A., i, 248.
- Legumin, constitution of (FLEURENT), A., i, 112.
 the globulin in peas and vetches (OSBORNE and CAMPBELL), A., i, 715.
- Leguminosæ*, pentoses in (GOETZE and PFEIFFER), A., ii, 443.
 See also Agricultural chemistry. (Appendix.)
- Lemon-grass oil, semicarbazones from (BARBIER and BOUVEAULT), A., i, 311.
- Lemonol. See Geraniol.
- Lepidolite, constitution of (CLARKE), A., ii, 37.
- Lepidomelane from Japan (KOTŌ), A., ii, 39.
 from Ontario (HOFFMANN), A., ii, 257.
 from Thuringia (FROMME), A., ii, 370.
- Lepidotic acid in wing-scales of Pieridæ (HOPKINS), A., ii, 198.
- Lepra chlorina*, occurrence of stereo-caulic acid in (ZOPF), A., i, 104.
- Leucaniline, preparation of (HOFMANN LECTURE), T., 613.
- Leucin, occurrence of, in *Vicia sativa* (SCHULZE), A., ii, 208.
- Leucinimide (COHN), A., i, 658.
 identical with a pyridine derivative from the hydrolysis of albumin (RITTHAUSEN), A., i, 716.
- Leucite-basalt from Vesuvius (THORPE), A., ii, 41.
- Leucite-nepheline group (RAMMELSBURG), A., ii, 189.
- Leucodendron concinnum*, constituents of (HESSE), A., i, 495.
- Leucodrin and its triacetyl derivative (HESSE), A., i, 495.
- Leucol. See Quinoline.
- Leucosin in barley (OSBORNE), A., i, 455.
 from malt (OSBORNE and CAMPBELL), A., i, 714.
 preparation and properties of (OSBORNE), A., i, 399.
- Leucotin, identity of, with a mixture of methylprotocotoin and methylhydrocotoin (NEGRI), A., i, 655.
- Levulinic acid (*β-acetylpropionic acid*, *acetonylacetic acid*) (KIERMAYER), A., i, 144.
 condensation of, with benzil (JAPP and MURRAY), P., 1896, 146.
 as a source of acetone in urine (WEINTRAUD), A., ii, 490.
 ethylic salt, action of ethylic brom-

- isobutyrate on (PERKIN and THORPE), P., 1896, 156.
- Levulinic acid, β -bromo-, ethylic salt, action of ethylic sodiomalonate on (EMERY), A., i, 414.
- α -cyano-, ethylic salt (KLOBB), A., i, 126.
- methylic salt (KLOBB), A., i, 126.
- phenylhydrazone of (KLOBB), A., i, 126.
- Levulochloral and its benzoyl derivative (HANRIOT), A., i, 519.
- Levulose (*fructose*), solution of, action of heat on (RAYMANN and ŠULC), A., i, 459.
- transformation of, into glucose and mannose (DE BRUYN and VAN EKENSTEIN), A., i, 116.
- hydrazines of, non-crystalline (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- action of chloral on (HANRIOT), A., i, 519.
- action of glyoxylic acid on (BOETINGER), A., i, 6.
- action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
- action of lead hydroxide on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
- action of lead hydroxide and potash on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
- action of oxalic acid on (DÜLL), A., i, 121.
- relative proportion of, to glucose in sweet wines (KÖNIG), A., ii, 79.
- reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 152; P., 1896, 9.
- extent of action of, on alkaline copper solutions (KJELDAHL), A., ii, 453.
- estimation of, by copper potassium carbonate (OST), A., ii, 453.
- estimation of, by Fehling's solution (KJELDAHL), A., ii, 581.
- estimation of, in honeys, &c. (WILEY), A., ii, 342.
- licarcol, source of (BARBIER and BOUVEAULT), A., i, 55.
- constitution of (BARBIER and BOUVEAULT), A., i, 491.
- oxidation of (BARBIER and BOUVEAULT), A., i, 345.
- licarhodolaldehyde, conversion of, into lemonaldehyde (BARBIER and BOUVEAULT), A., i, 345.
- licarhodol, source of (BARBIER and BOUVEAULT), A., i, 55.
- composition of (BERTRAM and GILDEMEISTER), A., i, 381.
- Licarhodol, constitution of (BARBIER and BOUVEAULT), A., i, 491.
- oxidation of (BARBIER and BOUVEAULT), A., i, 345.
- Lichens, occurrence of atranoric acid and allied compounds in (ZOPF), A., i, 103.
- Light, retarding action of hydrochloric acid and chlorides on the decomposition of chlorine water by (KLIMENKO), A., ii, 90.
- action of, on a solution of ferric chloride and oxalic acid (LEMOINE), A., ii, 285.
- action of, on mercurous acetate (HADA), T., 1674; P., 1896, 183.
- dissociation of mercurous nitrate by (HADA), T., 1668; P., 1896, 183.
- action of, on mercurous sulphate (HADA), T., 1673; P., 1896, 183.
- action of, on ethylic ether (RICHARDSON and FORTEY), T., 1352; P., 1896, 165.
- action of, on amyllic alcohol, &c. (RICHARDSON and FORTEY), T., 1349; P., 1896, 164.
- action of, on organic acids in presence of uranium salts (FAY), A., i, 464, 465.
- effect of, on development of rancidity in fats (SPAETH), A., i, 664.
- effect of, on diastase (GREEN), A., i, 110.
- effect of, on assimilation of nitrogen (STOKLASA), A., ii, 205.
- LIGHT:—
- Circular polarisation. See Rotatory power.
- Colour, origin of (ARMSTRONG), P., 1896, 42.
- of atom, ion, and molecule, relations between the (LEA), A., ii, 639.
- of ions, connection between atomic weight and the (THOMSEN), A., ii, 6; (LEA), A., ii, 594.
- of solutions of potassium chromoxalate (HAMBURGER), A., ii, 86.
- Dispersion of organic compounds containing oxygen (ANDERLINI), A., ii, 229.
- molecular, of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 476; P., 1896, 70.
- rotatory. See Rotatory dispersion.
- Infra-red light, action of, on silver sulphide (RIGOLLOT), A., ii, 3.
- Luminosity of inorganic compounds exposed to cathode rays (WIEDEMANN and SCHMIDT), A., ii, 287.

LIGHT:—

- Luminosity of hydrocarbon flames, cause of the (LEWES), A., ii, 141.
 of solid and liquid organic compounds produced by the cathode discharge (WIEDEMANN and SCHMIDT), A., ii, 86.
 Magnetic rotatory power, apparatus for determining (PERKIN), T., 1027; P., 1896, 122.
 effect of temperature on (PERKIN), T., 1058; P., 1896, 122.
 of organic substances, chiefly aromatic (PERKIN), T., 1026; P., 1896, 122.
 of mixtures (PERKIN), T., 1052; P., 1896, 122.
 Optical behaviour of the sulphates containing potassium, rubidium, and caesium, influence of atomic weight on the (TUTTON), T., 499; P., 1896, 71.
 Optically active compounds, inversion of (ARMSTRONG), P., 1896, 46.
 and inactive substances, molecular weights of (TRAUBE), A., i, 526.
 Phosphorescence produced by Röntgen rays (JACKSON), P., 1896, 58.
 Photography, endo- and exo-thermic reactions in (NAMIAS), A., ii, 459.
 in colours (RICHARD), A., ii, 406.
 Developer, quinine as a (ACKERMANN), A., i, 513.
 Photometric unit, use of acetylene as a (VIOLE), A., ii, 347.
 Polarimeter for chemical purposes (LANDOLT), A., ii, 230.
 Refraction, atomic, of oxygen in organic compounds (ANDERLINI), A., ii, 229.
 double, of gelatin-producing tissues, reversal by reagents of the (VON EBNER), A., ii, 457.
 Refraction equivalents of acetylacetone at different temperatures (PERKIN), T., 2; P., 1895, 199.
 of benzil (ANDERLINI), A., ii, 229.
 of benzoic anhydride (ANDERLINI), A., ii, 229.
 of γ -isocapro lactone (ANDERLINI), A., ii, 229.
 of coumarin (ANDERLINI), A., ii, 229.
 of dibutyl (ANDERLINI), A., ii, 229.
 of isodibutyl ketone (ANDERLINI), A., ii, 229.
 of diethyl ketone (ANDERLINI), A., ii, 229.

LIGHT:—

- Refraction equivalents of dimethylfumaric anhydride (ANDERLINI), A., ii, 229.
 of diphenylmethane (ANDERLINI), A., ii, 229.
 of dipropionyl (ANDERLINI), A., ii, 229.
 of dipropyl ketone (ANDERLINI), A., ii, 229.
 of isodivaleryl (ANDERLINI), A., ii, 229.
 of lactide (ANDERLINI), A., ii, 229.
 of malic anhydride (ANDERLINI), A., ii, 229.
 of phenolphthalein (ANDERLINI), A., ii, 229.
 of propionic anhydride (ANDERLINI), A., ii, 229.
 of pyrotartaric anhydride (ANDERLINI), A., ii, 229.
 of succinic anhydride (ANDERLINI), A., ii, 229.
 of terebic acid (ANDERLINI), A., ii, 229.
 of *o*-toluidine at different temperatures (PERKIN), T., 4; P., 1895, 199.
 of *p*-toluidine at different temperatures (PERKIN), T., 4; P., 1895, 199.
 of triphenylmethane (ANDERLINI), A., ii, 229.
 of isovaleric anhydride (ANDERLINI), A., ii, 229.
 of γ -valerolactone (ANDERLINI), A., ii, 229.
 Refraction, molecular, new formula for (EIJKMAN), A., ii, 133; (ZECCHINI), A., ii, 285.
 influence of electrolytic dissociation on (LE BLANC and ROHLAND), A., ii, 345.
 of crystalline salts, additive nature of (POPE), T., 1530; P., 1896, 178.
 of substances in the solid and liquid states compared (POPE), T., 1533; P., 1896, 178.
 of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 476, 503; P., 1896, 70.
 of the salts of the polythionic acids (HERTLEIN), A., ii, 353.
 Refractive index, mean, of anisotropic crystals (POPE), T., 1530; P., 1896, 177.
 Refractive indices of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 463; P., 1896, 69.

LIGHT:—

- Refractive indices of organic substances (EIJKMAN), A., ii, 133.
 Refractive power of argon and helium (RAYLEIGH), A., ii, 598.
 Refractometer, a new (PULFRICH), A., ii, 161.
 applied to butteranalysis (BESANA), A., ii, 129.
 Radiations which affect a sensitive plate after traversing metals (LE BON), A., ii, 347.
 phosphorescent, photographic action of (BECQUEREL), A., ii, 406.
 Röntgen rays, methods of producing, and nature of (JACKSON), P., 1896, 58.
 properties of (PERRIN), A., ii, 347.
 relative opacity of substances for (NOVÁK and ŠULC), A., ii, 406.
 influence of the, on chemical changes (DIXON and BAKER), T., 1308; P., 1896, 160.
 influence of the, on the combination of carbonic oxide and oxygen (DIXON), T., 788; P., 1896, 56.
 Rotatory power of substances in the crystalline and amorphous condition (POPE), T., 971; P., 1896, 116.
 influence of position isomerism on (FRANKLAND and WHARTON), T., 1583; P., 1896, 186.
 of two asymmetric carbon atoms, superposition of the (GUYE and GOUDET), A., ii, 134; (WALDEN), A., ii, 138.
 of six asymmetric carbon atoms, superposition of the (GUYE and GOUDET), A., ii, 458.
 of the diamylic divaleryl tartrates (GUYE and GOUDET), A., ii, 458.
 of aspartic acid (MARSHALL), T., 1022; P., 1896, 146.
 of isobutylic dichloroacetyl tartrate (FREUNDLER), A., ii, 554.
 of cæsium dextro tartrate in the crystalline and liquid states (TRAUBE), A., ii, 509.
 of crystals of hydrated *trans*-camphotricarboxylic acid (POPE), T., 978; P., 1896, 116.
 of cholic acid, choleic acid, and deoxycholic acid (VAHLEN), A., i, 453.
 of ethylic diacetyl glycerate dissolved in acetic acid (FRANKLAND and PICKARD), T., 136; P., 1896, 11.

LIGHT:—

- Rotatory power of ethylic diacetyl glycerate dissolved in benzene (FRANKLAND and PICKARD), T., 135; P., 1896, 11.
 of ethylic dichloroacetyl tartrate (FREUNDLER), A., ii, 554.
 of derivatives of maleic and fumaric acids (WALDEN), A., ii, 633.
 of malic acid and its derivatives (WALDEN), A., ii, 135.
 of mandelic acid and its derivatives (WALDEN), A., ii, 137, 138.
 of matico-camphor in the crystalline and liquid states (TRAUBE), A., ii, 509.
 of methylic and ethylic monobenzoyl glycerates at different temperatures (FRANKLAND and MACGREGOR), T., 112; P., 1896, 10.
 of methylic dibenzoyl glycerate dissolved in acetic acid (FRANKLAND and PICKARD), T., 133; P., 1896, 11.
 of methylic dibenzoyl glycerate dissolved in benzene (FRANKLAND and PICKARD), T., 127; P., 1896, 11.
 of methylic dibenzoyl glycerate dissolved in ethylene dibromide (FRANKLAND and PICKARD), T., 130; P., 1896, 11.
 of methylic dibenzoyl glycerate dissolved in nitrobenzene (FRANKLAND and PICKARD), T., 131; P., 1896, 11.
 of methylic and ethylic dibenzoyl tartrates (FRANKLAND and WHARTON), T., 1585; P., 1896, 186.
 of methylic dichloroacetyl tartrate (FREUNDLER), A., ii, 554.
 of methylic diphenylacetyl glycerate at different temperatures (FRANKLAND and MACGREGOR), T., 111; P., 1896, 10.
 of methylic dipropionyl glycerate at different temperatures (FRANKLAND and MACGREGOR), T., 116; P., 1896, 10.
 of methylic, ethylic, and propylic dibenzoyl glycerates at different temperatures (FRANKLAND and MACGREGOR), T., 104; P., 1896, 9.
 of the methylic and ethylic salts of *o*-, *m*-, and *p*-ditoluoyl tartaric acids (FRANKLAND and WHARTON), T., 1309, 1589; P., 1896, 148.

LIGHT:—

- Rotatory power of α -nitrocamphor in different solvents (PESCETTA), A., ii, 346.
- of patchouli camphor in the crystalline and liquid states (TRAUBE), A., ii, 509.
- of propylic dichloroacetyl tartrate (FREUNDLER), A., ii, 554.
- of superfused and dissolved rhamnose (GERNEZ), A., ii, 287.
- of rubidium tartrate in the crystalline and liquid states (TRAUBE), A., ii, 509.
- of succinic acid and its derivatives (WALDEN), A., ii, 135.
- Specific rotatory power, influence of solvents on and of ring formation on (FORSTER), T., 40.
- of ethylic acetyl-*d*-lactate (PURDIE and WILLIAMSON), T., 828; P., 1896, 97.
- of ethylic acetylmalate (PURDIE and WILLIAMSON), T., 824; P., 1896, 97.
- of ethylic butyrylmalate (PURDIE and WILLIAMSON), T., 825.
- of ethylic dextrochloropropionate (PURDIE and WILLIAMSON), T., 829; P., 1896, 97.
- of ethylic *d*-lactate (PURDIE and WILLIAMSON), T., 827; P., 1896, 97.
- of malic acid and its potassium salt (PURDIE and WILLIAMSON), T., 822.
- of the methylic, ethylic, propylic, isopropylic, normal butylic, and isobutylic salts of malic acid (PURDIE and WILLIAMSON), T., 823; P., 1896, 97.
- of valeric acid and its salts (GUYE and ROSSI), A., ii, 85.
- Birotation, cause of (LIPPMANN), A., ii, 230.
- of glucose in different solvents (TREY), A., ii, 139.
- Rotatory dispersion in non-associating liquids (GUYE and JORDAN), A., ii, 459.
- of malic acid, anomalous (NASINI and GENNARI), A., ii, 133, 285.
- of nicotine and its salts (GENNARI), A., ii, 286.
- Spectrum or spectra (spark) of non-metals in the vapour of alkali salts (DE GRAMONT), A., ii, 585.
- of argon (RAYLEIGH and RAMSAY), A., ii, 103; (FRIEDLÄNDER), A., ii, 457.

LIGHT:—

- Spectrum or spectra, of argon when mixed with other gases (COLLIE and RAMSAY), A., ii, 634.
- blue, of argon (KAYSER), A., ii, 2.
- of argon, three different (EDER and VALENTA), A., ii, 405.
- of the carbon compound of argon (CROOKES), A., ii, 2.
- of carbon compounds (Geissler tube), (BOHN), A., ii, 140.
- of the Bunsen flame (BOHN), A., ii, 140.
- of the carbon bisulphide flame (BOHN), A., ii, 140.
- of the carbonic oxide flame (BOHN), A., ii, 140.
- of the flame of cyanogen (LEWES), T., 240; P., 1896, 2.
- of flames (EDER), A., ii, 287.
- of a candle flame (HARTLEY), T., 845.
- of the gas obtained from cleveite (helium) (RUNGE and PASCHEN), A., ii, 1.
- of gas from uraninite and eliasite (LOCKYER), A., ii, 597.
- of the sun, wave-length of the line D_3 in the (PALMER), A., ii, 405.
- of helium (CROOKES), A., ii, 1.
- of helium from different sources (RAMSAY), A., ii, 596.
- of helium when mixed with other gases (COLLIE and RAMSAY), A., ii, 634.
- of the hydrogen flame (BOHN), A., ii, 140.
- of mercury, line and band (EDER and VALENTA), A., ii, 2.
- of phosphorus (spark) in its compounds (DE GRAMONT), A., ii, 585.
- of the flame of sulphur (BOHN), A., ii, 140.
- Absorption spectrum or spectra, banded, interpretation of (ÉTARD), A., ii, 133.
- of bromine dissolved in carbon bisulphide vapour (WOOD), A., ii, 458.
- of the cobalt salts, origin of the (ÉTARD), A., ii, 133.
- of the chromium salts, original of the (ÉTARD), A., ii, 133.
- of solutions of potassium chromoxalate (HAMBURGER), A., ii, 86.
- of iodine dissolved in carbon bisulphide vapour (WOOD), A., ii, 458.
- of organic colouring matters (KRÜSS), A., ii, 285.
- of chromothiocyanates (MAGNANINI), A., ii, 345.

LIGHT :

- Absorption spectrum or spectra of hæmoglobin and compounds (GAMGEE), A., i, 713.
- of indophenols (BAYRAC and CAMICHEL), A., ii, 345.
- of urobilin (GARROD and HOPKINS), A., i, 713.
- of violuric acid and its salts (DONNAN), A., ii, 405.
- Fluorescence spectrum or spectra, of argon (DORN and ERDMANN), A., ii, 2.
- of potassium vapour (WIEDEMANN and SCHMIDT), A., ii, 346.
- of sodium vapour (WIEDEMANN and SCHMIDT), A., ii, 346.
- of gaseous organic substances (WIEDEMANN and SCHMIDT), A., ii, 86.
- Spectrum analysis of gases, method of filling vacuum tubes for (YOUNG and DARLING), A., ii, 3.
- quantitative, new method of (KRÜSS), A., ii, 215.
- Velocity of light along the axes of the optical ellipsoid of double sulphates of potassium, rubidium, and cæsium (TUTTON), T., 466; P., 1896, 69.
- gualoes, oil of, constituents of (BARBIER and BOUVEAULT), A., i, 55.
- mburgite from East Lothian (HATCH), A., ii, 116.
- me. See Calcium oxide, also Agricultural chemistry (Appendix).
- mes, oil of, constituents of (GILDEMEISTER), A., i, 54.
- mestone from Bohemia (ŠTOLBA), A., ii, 435.
- from New South Wales (LIVERSIDGE), A., ii, 658.
- mestones from Burma, minerals of, (BROWN and JUDD), A., ii, 33.
- and dolomites from Canada (HARRINGTON), A., ii, 116.
- from Sussex Co., New Jersey (NASON), A., ii, 435.
- monene, influence of solvents on specific rotatory power of (KREMERS), A., i, 177.
- hydrochloride, conversion into terpene hydrate (KREMERS), A., i, 177.
- limonene nitrosochloride, behaviour of, towards halogen hydrides (VON BAEYER), A., i, 246.
- malol, sources of (GILDEMEISTER), A., i, 54.
- purification of (TIEMANN and KRÜGER), A., i, 382.
- oleic acid (HÉBERT), A., i, 638.
- Linseed oil, compound of, with sulphur (HENRIQUES), A., i, 204.
- oxidisability of (BISHOP), A., ii, 399.
- iodine and bromine absorptions of (WILLIAMS), A., ii, 281.
- iodine number of pure and boiled (KATZ), A., ii, 680.
- raw and boiled, examination of (HEFELMANN and MANN), A., ii, 680.
- Lipoxanthin series of dyes (SCHRÖTTER-KRISTELLI), A., ii, 208.
- Liquefaction of gases. See Gases.
- Lithiophilite and triphylite, optical properties of (PENFIELD and PRATT), A., ii, 184.
- Lithium, preparation of (BORCHERS), A., ii, 520; (WARREN), A., ii, 646.
- spark spectra of the salts of (DE GRAMONT), A., ii, 585.
- combination of, with nitrogen (DESLANDRES), A., ii, 299; (GUNTZ), A., ii, 300.
- Lithium bromide, thermochemical data of the compound of mercuric cyanide with (VARET), A., ii, 88.
- carbide (MOISSAN), A., ii, 419.
- chloride, electrolysis of a solution of, in acetone (ŁASZCZYŃSKI), A., ii, 556.
- absorption of moisture by (HAKE), P., 1896, 34.
- subchloride (GUNTZ), A., ii, 299.
- hydride (GUNTZ), A., ii, 359.
- iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
- nitrate, vapour pressures of concentrated solutions of (WADDELL), A., ii, 151.
- zirconate (VENABLE and CLARKE), A., ii, 653.
- cyanide, thermochemical data of (VARET), A., ii, 149.
- Lithofellic acid, preparation and properties of, from gall-stones (JÜNGER and KLAGES), A., i, 194.
- Lithofellolactone, preparation of, by hydrolysis of lithofellic acid (JÜNGER and KLAGES), A., i, 194.
- Liver, iron in (WOLTERING), A., ii, 197.
- storage of iron in the (STOCKMAN), A., ii, 438.
- relation of, to fat (NOËL-PATON), A., ii, 316.
- formation of sugar in the (MOSSE), A., ii, 617.

Liver, cause of formation of sugar in, after death (PAVY), A., ii, 665.
 of the dolphin, substances present in the (DRECHSEL), A., ii, 378.
 estimation of glycogen in (KISTIAKOFFSKY), A., ii, 80.
Lobaria pulmonacea, cholesterol from (GÉRARD), A., i, 21.
 Löllingite, cobaltiferous, from Ontario (HOFFMANN), A., ii, 258.
Lolium ital., potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
 Lomatiol, constitution of (HOOKER), T., 1369, 1381.
iso-Lomatiol, preparation of (HOOKER), T., 1382.
 Lophine, synthesis of (KULISCH), A., i, 627.
 Lophophorine, properties of (HEFFTER), A., i, 268.
 Lorandite from Allehar, Macedonia (KRENNER), A., ii, 30.
 Lucerne, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
 Lupin, conglutin, the principal proteid in (OSBORNE and CAMPBELL), A., i, 716.
 Lupins. See Agricultural chemistry.
Lupinus, conglutin, the principal proteid in (OSBORNE and CAMPBELL), A., i, 716.
albus, alkaloid from, properties of, its salts and its extraction (SOLDAINI), A., i, 193.
luteus, decomposition of albumin in (ZIEGENBEIN), A., ii, 265.
 and *L. angustifolius*, occurrence of paragalactan in cell-wall of cotyledons of (SCHULZE), A., ii, 619.
angustifolius and *L. luteus*. See Agricultural chemistry.
 Luteolin, the colouring matter of weld (PERKIN), T., 206; P., 1896, 37.
 preparation of, from weld extract (PERKIN), T., 207.
 preparation and properties of compounds of, with mineral acids (PERKIN), T., 208.
 constitution of (PERKIN), T., 212, 799; P., 1896, 37, 105.
 relation of, to fisetin and chrysin (HERZIG), A., i, 494.
 relation of, to quercetin (PERKIN), T., 803; P., 1896, 105.
 decomposition of, with fused alkalis (PERKIN), T., 210, 801; P., 1896, 37, 105.
 tetracetyl and tetrabenzoyl derivatives

of (PERKIN), T., 210; P., 1896, 37.
 Luteolin, triethyl ether and its acetyl derivative (PERKIN), T., 800; P., 1896, 105.
 triethyl ether, decomposition of, with alcoholic potash (PERKIN), T., 802; P., 1896, 105.
 hydriodide, analysis of (PERKIN), T., 1442; P., 1896, 167.
 Luteolin, bromo-, acetyl derivative of (PERKIN), T., 210; P., 1896, 37.
 preparation and properties of (PERKIN), T., 209; P., 1896, 37.
 Lutidinedicarboxylic acids. See Dimethylpyridinedicarboxylic acids.
 Lymph, causes of formation of (MENDL), A., ii, 315; (LAZARUS-BARLOW), A., ii, 485; (COHNSTEIN), A., ii, 616.
 Lysidine, action of benzoic chloride and potassium carbonate on (LADENBURG), A., i, 201.
 hydrochloride, products of dry distillation of (LADENBURG), A., i, 201.
 Lyxonic acid (FISCHER and BROMBERG), A., i, 348.
 brucine salt (FISCHER and BROMBERG), A., i, 348.
 phenylhydrazide of (FISCHER and BROMBERG), A., i, 348.
 Lyxonolactone (FISCHER and BROMBERG), A., i, 348.
 Lyxose (*pentanetetronal*) (FISCHER and BROMBERG), A., i, 348.
 cyanhydrin of (FISCHER and BROMBERG), A., i, 348.
 Lysine, separation of pure (DRECHSEL), A., i, 268.
 Lysuric acid, barium salt of (DRECHSEL), A., i, 268.

M.

Maclura tinctoria, morin, the colouring matter of (PERKIN and BABLICH), T., 792; P., 1896, 106.
 Magenta. See Rosaniline.
 Magnesite from Servia (STANOJEVIĆ), A., ii, 254.
 Magnesium, solution and diffusion of, in mercury (HUMPHREYS), T., 1680; P., 1896, 220.
 action of, on a photographic plate (COLSON), A., ii, 601.
 action of, on solutions of salts (KIP-PENBERGER), A., ii, 522.
 action of, on aqueous solutions of

salts and other substances (VITALI), A., ii, 419.

Magnesium, combination of, with argon and helium (TROOST and OUVARD), A., ii, 99.

Magnesium salts, elimination of, in rickets (DE KONINCK), A., ii, 50.

bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.

carbonate, estimation of, in soil (MAUZELIUS and VESTERBERG), A., ii, 219.

sodium carbonate (SCHULTEN), A., ii, 610.

chlorocarbonate (SCHULTEN), A., ii, 610.

chloride, freezing points of dilute solutions of (LOOMIS), A., ii, 352.

absorption of moisture by (HAKE), P., 1896, 34.

cobaltite (DUFAY), A., ii, 647.

hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.

action of ammonium salts in preventing the precipitation of (LOVÉN), A., ii, 413.

iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.

niobate (LARSSON), A., ii, 564.

nitrate, absorption of moisture by (HAKE), P., 1896, 34.

basic (DIDIER), A., ii, 474.

nitride, action of acetic anhydride on (EMMERLING), A., i, 591.

action of benzoic anhydride on (EMMERLING), A., i, 591.

silver nitrite (SPIEGEL), A., ii, 360.

oxide (*magnesia*), action of dry hydrogen chloride on (VELEY), A., ii, 360.

See also Agricultural chemistry.

calcium phosphates from Algeria (MALBOT), A., ii, 185.

sodium triphosphate (STANGE), A., ii, 643.

silicate, a new mineral (CESÀRO), A., ii, 481.

hydrated, an artificial (KONINCK), A., ii, 480.

sulphate, thermal expansion of solutions of (DE LANNON), A., ii, 233.

density of very dilute solutions of (KOHLEBAUSCH), A., ii, 90.

solubility of isomorphous mixtures of zinc sulphate and (STORTENBEKER), A., ii, 14.

cæsium sulphate, density and optical behaviour of (TUTTON), T., 366.

Magnesium ~~salt~~, potassium sulphate, optical behaviour of (TUTTON), T., 356.

density of (TUTTON), T., 355.

rubidium sulphate, density and optical behaviour of (TUTTON), T., 361.

alums, natural (CARD), A., ii, 530.

zinc alum from New South Wales (CARD), A., ii, 252.

Magnesium allylide (KEISER), A., i, 457.

cyanide, thermochemical data of (VARET), A., ii, 149.

estimation of, as pyrophosphate (NEUBAUER), A., ii, 674.

Magnetic pyrites. See Pyrrhotite.

Magnetic rotation. See Light, magnetic rotatory power.

Magnetite from Servia (LOSANITSCH), A., ii, 252.

magnetic behaviour of (ABT), A., ii, 657.

artificial (MÜLLER), A., ii, 254.

containing manganese and aluminium from Madras (HOLLAND), A., ii, 254.

Maize meal, proteids from (KJELDAHL), A., i, 584.

Maize. See also Agricultural chemistry. (Appendix.)

Maleic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.

behaviour of, when heating under small pressure (KRAFFT and DYES), A., ii, 89.

conversion of, into fumaric acid (MICHAEL), A., i, 132.

amylic salt, rotatory power of the (WALDEN), A., ii, 633.

Maleic acid, bromo- (MICHAEL), A., i, 131.

melting point and behaviour of, towards aqueous potash (MICHAEL), A., i, 131.

silver salt, action of heat on aqueous solution of (MICHAEL), A., i, 131.

amylic salt, rotatory power of (WALDEN), A., ii, 633.

dibromo-, ethylic salt, loss of halogen by (MICHAEL and CLARK), A., i, 132.

chloro-, from dichlorosuccinic acid (MICHAEL and TISSOT), A., i, 132.

behaviour of, towards aqueous potash of (MICHAEL), A., i, 131.

amylic salt, rotatory power of (WALDEN), A., ii, 633.

ethylic salt, behaviour of, towards

- ethylic acetoacetate (RUHEMANN and TYLER), T., 535.
 Malcic anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.
 action of alcoholic ammonia on (PIUTTI), A., i, 669.
 Maleic anhydride, dibromo-, action of carbamide on (DUNLAP), A., i, 471.
 Maleimide, dibromo- (DUNLAP), A., i, 471.
 Maleinanil, bromo- (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
 Malein-*p*-tolil, bromo- (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
 Maleinuric acid, dibromo- (DUNLAP), A., i, 471.
 Maleinuric acid, dichloro- (DUNLAP), A., i, 471.
 Malic acid, configuration of (FISCHER), A., i, 526.
 and its potassium salt, specific rotation of (PURDIE and WILLIAMSON), T., 822.
 anomalous rotatory dispersion of (NASINI and GENNARI), A., ii, 133, 285.
 action of isopropyl iodide on the silver salt of (PURDIE and WILLIAMSON), T., 825.
 in fruit juices (KREMLA), A., ii, 62.
 ethylic salt, preparation of (WISLICENUS), A., i, 672.
 methylic, ethylic, propylic, isopropylic, normal butylic, isobutylic, amylic, and octylic salts of, specific rotation of the (PURDIE and WILLIAMSON), T., 823; P., 1896, 97; (WALDEN), A., ii, 135, 136.
 Malic acid, thio- (ANDREASCH), A., i, 90.
l-Malic acid from asparagine and aspartic acid (WALDEN), A., i, 139.
 Malic acid, lævo- and inactive, rotatory powers of the lævo- and inactive amylic salts of (WALDEN), A., ii, 139.
 Mallow, dye of (WEIGERT), A., i, 388.
 Malonamide, action of hypobromite and of bromine and potash on (WEIDEL and ROITHNER), A., i, 470, 471.
 Malonenediamidoxime and its diacetyl and dibenzoyl derivatives (SCHMIDTMANN), A., i, 458.
 Malonenediazoximedibenzenyl (SCHMIDTMANN), A., i, 458.
 Malonenediazoximediethenyl (SCHMIDTMANN), A., i, 458.
 Malonic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
 absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
 Malonic acid, action of isobutaldehyde and acetic acid on (BRAUN), A., i, 594.
 potassium uranyl salt of (FAY), A., i, 465.
 ethylic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
 hydrolysis of (HJELT), A., i, 205.
 velocity of formation of alkyl derivatives of (BISCHOFF), A., i, 84.
 action of sodium ethoxide and β -bromomethyl phenylether on (BENTLEY, HAWORTH, and PERKIN), T., 167, 169; P., 1896, 35, 36.
 action of diethyl bromomalonate on, in presence of sodium ethoxide (BISCHOFF), A., i, 468.
 condensation of, with phenacetic chloride (SCHOTT), A., i, 700.
 methylic salt, thermochemical data of (GUINCHANT), A., ii, 12.
 action of methylic bromomalonate on, in presence of sodium ethoxide (BISCHOFF), A., i, 468.
 action of sodium methoxide and iodine on (BISCHOFF), A., i, 468.
 Malonic acid, bromo-, ethylic salt, action of ethylic sodethylmalonate on (BISCHOFF), A., i, 527.
 action of ethylic sodiopropionate 1 : 2 : 2 : 3 : 3-pentacarboxylic acid on (BISCHOFF), A., i, 601.
 action of sodium ethoxide on (BISCHOFF), A., i, 469.
 methylic salt, action of methylic sodethanetricarboxylate on (BISCHOFF), A., i, 600.
 action of sodium methoxide on (BISCHOFF), A., i, 468.
 chloro-, ethylic salt, action of ethylic sodethylmalonate on (BISCHOFF), A., i, 527.
 action of sodium ethoxide on (BISCHOFF), A., i, 469.
 oximido- (ANDREASCH), A., i, 88.
 sodio-, ethylic salt, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
 action of ethylic α -bromobutyrate, α -bromoisobutyrate, α -bromopropionate, and α -bromoisovalerate on (BISCHOFF), A., i, 467.
 action of ethylic α -bromomethyl-ethylacetate on (AUWERS and SCHLOSSER), A., i, 640.
 action of ethylic chloracetate on (BISCHOFF), A., i, 466.
 action of ethylic chlorethylmalonate and bromethyl-

- malonate on (BISCHOFF), A., i, 528.
- Malonic acid, sodio-, ethylic salts, action of ethylic chloromethylmalonate and bromomethylmalonate on (BISCHOFF), A., i, 527.
- action of ethylic isopropylacrylate on (PERKIN), T., 1490.
- action of ethylic $\alpha\beta$ -trimethylpropionate on (PERKIN and THORPE), T., 1485.
- action of tetrahalogen ethylene compounds on (BISCHOFF), A., i, 130.
- action of trimethylenic bromide on (BISCHOFF), A., i, 130.
- methylic salt, action of carbon tetrachloride on (ZELINSKI and PORCHUNOW), A., i, 135.
- Malonic acids, sodioalkyl-, comparative ease of the action of the ethylic salts of α -bromo-fatty acid on the ethylic salts of (BISCHOFF), A., i, 464.
- Malononitrile, action of hydroxylamine on (SCHMIDTMANN), A., i, 458.
- action of alcoholic sodium ethoxide on (SCHMIDTMANN), A., i, 458.
- condensation of, with diazobenzene nitrate (SCHMIDTMANN), A., i, 459.
- Malonylazoimide (CURTIUS), A., i, 35.
- Malt, preparation of diastase from (OSBORNE and CAMPBELL), A., i, 716.
- proteids of (OSBORNE and CAMPBELL), A., i, 714.
- estimation of sucrose in (JALOWETZ), A., ii, 225.
- Malt extract, special ferment (cytase) in (GRÜSS), A., ii, 669.
- estimation of (HERON), A., ii, 343; (STERN), A., ii, 396.
- Maltase, occurrence of, in plants (BOURQUELOT), A., i, 111.
- Maltodextrins. See Dextrins.
- Maltose, action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
- action of alcoholic ammonia on (DE BRUYN and VAN LEENT), A., i, 119.
- action of dextrin on (JALOWETZ), A., i, 405, 406.
- hydrolysis of, by yeast (LINTNER), A., i, 4.
- alcoholic fermentation of (BOURQUELOT), A., i, 111.
- fermentation of, by *Eurotiopsis Gayoni* (LABORDE), A., ii, 322.
- digestion of (BOURQUELOT and GLEY), A., ii, 315.
- Maltose, reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 153; P., 1896, 9.
- estimation of, by copper potassium carbonate (OST), A., ii, 453.
- estimation of, by Fehling's solution (KJELDAHL), A., ii, 581.
- iso-Maltose, two possible stereoisomeric modifications of (LINTNER), A., i, 119.
- Lintner's, evidence against the existence of (ULRICH), A., i, 335; (JALOWETZ), A., i, 406.
- non-identity of, with maltose (FISCHER), A., i, 119, 120.
- action of diastase on (LINTNER), A., i, 119.
- hydrolysis of, by yeast (LINTNER), A., i, 4.
- meta-Maltose (MITTELMEIER), A., i, 336.
- Maltoseamine (DE BRUYN and VAN LEENT), A., i, 119.
- Malyltropeine (MERCK), A., i, 65.
- Mandelamide (HALLER), A., i, 32.
- rotatory power of (WALDEN), A., ii, 138.
- Mandelic acid (*phenylglycollic acid*), rotatory power of (WALDEN), A., ii, 138.
- action of phenylcarbimide on (HALLER), A., i, 32.
- methoxybenzylideneamide of (MINOVICI), A., i, 703.
- potassium salt, electrolysis of (WALKER), T., 1279.
- methylic, ethylic, isobutylic, and amylic salts, rotatory power of the (WALDEN), A., ii, 138.
- p-aminophenetoil salt (WENGHÖFFER), A., i, 360.
- Mandelic acids, lævo- and inactive, amylic salts of, rotatory powers of the lævo- and inactive (WALDEN), A., ii, 139.
- Mandelonitrile, compound $C_{15}H_{12}N_2$ obtained by the action of alcoholic ammonia on (VON MEYER), A., i, 420.
- Manganapatite from Bavaria (WEIN-SCHENK), A., ii, 310.
- Manganese alloys with aluminium (COMBES), A., ii, 604.
- Manganese carbide (MOISSAN), A., ii, 423.
- thermochemical data of (LE CHATELIER), A., ii, 350.
- carbonate, thermochemical data of (LE CHATELIER), A., ii, 350.
- chloride, electrolytic dissociation of, at different temperatures (SALVADORI), A., ii, 512.

- Manganese hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- niobate (LARSSON), A., ii, 564.
- nitrate, hydrated, absorption of moisture by (HAKE), P., 1896, 34.
- monoxide, thermochemical data of (LE CHATELIER), A., ii, 350.
- dioxide (*peroxide*), electrodes in galvanic cells (TOWER), A., ii, 142.
- thermochemical data of (LE CHATELIER), A., ii, 350.
- action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- precipitation of, by hypochlorous acid (E. and B. KLIMENKO), A., ii, 303.
- reduction of permanganic acid by (MORSE, HOPKINS, and WALKER), A., ii, 475.
- Permanganic acid, reduction of, by manganese dioxide (MORSE, HOPKINS, and WALKER), A., ii, 475.
- permanganates, electrochemical preparation of (LORENZ), A., ii, 650.
- potassium permanganate, estimation of, by means of sulphuric acid (MORSE and CHAMBERS), A., ii, 388.
- standardisation of (RIEGLER), A., ii, 676.
- Manganese sodium triphosphate (STANGE), A., ii, 643.
- silicate, thermochemical data of (LE CHATELIER), A., ii, 350.
- silicide (VIGOUROUX), A., ii, 249.
- sulphide, crystallised anhydrous (MOURLOT), A., ii, 25.
- cæsium sulphate, density and optical behaviour of (TUTTON), T., 403.
- rubidium sulphate, density and optical behaviour of (TUTTON), T., 399.
- Manganese, estimation of, electrolytically (ENGELS), A., ii, 276.
- estimation of, volumetrically (AUCHY), A., ii, 339; (STONE), A., ii, 547.
- estimation of, in iron ores (MIXER and DUBOIS), A., ii, 547.
- estimation of, in steel, errors in (AUCHY), A., ii, 627.
- separation of, qualitatively from iron, nickel, cobalt, chromium, aluminium, and zinc (HARE), A., ii, 127.
- separation of arsenic from (JANNASCH and KAMMERER), A., ii, 221.
- separation of chromium from (JANNASCH and VON CLOEDT), A., ii, 222.
- Manganese, separation of cobalt from (JANNASCH and LEHNERT), A., ii, 547.
- separation of copper and zinc from (JANNASCH), A., ii, 546.
- separation of zinc from (JANNASCH and VON CLOEDT), A., ii, 220.
- Manganite from Michigan (HOBBS), A., ii, 33.
- Manganocolumbite from Maine (FOOTE), A., ii, 660.
- Mannan, occurrence of two kinds of, in the roots of *Conophallus konjak* (KINOSHITA), A., ii, 60.
- as a food (TSUJI), A., ii, 44.
- hydrolysis of (KINOSHITA), A., ii, 60.
- Mannitol, boiling point of, under reduced pressure (KRAFFT and DYES), A., ii, 89.
- heat of solution of, in water (SPEYERS), A., ii, 411.
- fermentation of, in Sicilian wines (BASILE), A., ii, 121.
- l*-Mannonic acid, velocity of lactone formation in (HJELT), A., i, 597.
- Mannose, preparation of, from ivory-nut turnings (DE WITT), A., i, 459.
- transformation of, into glucose and fructose (DE BRUYN and VAN EKENSTEIN), A., i, 116.
- action of ammonia on (DE BRUYN and VAN LEENT), A., i, 586.
- action of lead hydroxide on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
- action of lead hydroxide and potash on (DE BRUYN and VAN EKENSTEIN), A., i, 588.
- d*-Mannose, crystallised (VAN EKENSTEIN), A., i, 272.
- Mannose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Mannose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Mannose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Mannose-ethylenemercaptal (LAWRENCE), A., i, 272.
- Mannose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Mannose-naphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Manures. See Agricultural chemistry (Appendix).
- Marbles, onyx- (MERRILL), A., ii, 260.
- Marcasite, constitution of (BROWN), A., ii, 108.

- Margarine cheese. See Agricultural chemistry (Appendix).
- Marsh gas, composition of (SCHLOESING), A., i, 401.
- Martite, artificial (FRIEDEL), A., ii, 110.
- Martylamine. See Diphenyl, *p*-amino-.
- Mascarine, action of, on the embryonic heart (PICKERING), A., ii, 46.
- Matico-camphor, rotatory power of, in the crystalline and liquid states (TRAUBE), A., ii, 509.
- Matrine, properties, physiological action, and salts of (PLUGGE), A., i, 68.
- Mauve, discovery of (HOFMANN LECTURE), T., 604; P., 1893, 138.
- Mauveine and its salts (HOFMANN LECTURE), T., 613.
action of ethylic iodide on (HOFMANN LECTURE), T., 617.
- Meat, influence of feeding on the composition of (WOODS and PHELPS), A., ii, 44.
- Meat-extract, composition of (KÖNIG and BOMER), A., ii, 83.
estimation of gelatin in (KÖNIG), A., ii, 83; (STUTZER), A., ii, 84.
estimation of phosphoric acid in (BALKE and IDE), A., ii, 632.
- Medlar, composition of the (BERSCH), A., ii, 383.
- Medusa, violet pigment of the (GRIFFITHS and PLATT), A., i, 182.
- Meerschau from Servia (LOZANIĆ), A., ii, 252.
- Melamine, constitution of (HOFMANN LECTURE), T., 717.
- Melaniline. See Diphenylguanidine.
- Melanoximide. See Oxalyldiphenylguanidine.
- Melanterite, zinciferous, from Carinthia (BRUNLECHNER), A., ii, 256.
from Laurion (MICHEL), A., ii, 36.
- Melibiose, an enzyme of yeast (BAU), A., i, 453.
- Melibiose, formation of, from melitriose (BAU), A., i, 453.
hydrolysis of, by certain enzymes (FISCHER and LINDNER), A., i, 195.
- Melissic acid from beeswax (MARIE), A., i, 347.
methylic and ethylic salts (MARIE), A., i, 347.
glycerylic salts of (MARIE), A., i, 347.
- Melitriose, hydrolysis of (BAU), A., i, 453.
- Melons. See Agricultural chemistry (Appendix).
- Melting point. See Heat.
- Membrane, a perfect semi-permeable (FITZGERALD), T., 905; P., 1896, 25.
- Membranes, semi-permeable, theory of (FITZGERALD), T., 897; P., 1896, 25.
- Memorial lectures: Helmholtz (FITZGERALD), T., 885; P., 1896, 26.
Hofmann (ABEL, ARMSTRONG, PERKIN, PLAYFAIR), T., 575; P., 1893, 133.
Lothar Meyer (BEDSON), T., 1403; P., 1896, 119.
- Mendozite? from Argentina (SCHICKENDANTZ), A., ii, 480.
- Menthane, $C_{10}H_{20}$ (KIJNER), A., i, 178.
from menthol (TOLLOCZKO), A., i, 381.
identical with hexahydrocymene (JÜNGER and KLAGES), A., i, 245.
- Menthane-1 : 2 : 6 : 8-tetrol. See Sobreritritol.
- Menthene, from menthylic chloride (MASSON and REYCHLER), A., i, 620.
constitution and oxidation of (TOLLOCZKO), A., i, 381.
- $\Delta^{8(9)}$ -Menthene-1 : 2-diol, from trihydroxymenthane, diacetate (GINZBERG), A., i, 447.
- Δ -Menthene-2 : 8-diol. See Sobrerol.
- Mentheneglycol, modifications of (TOLLOCZKO), A., i, 381.
- Menthol, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
crystalline modifications of (POPE), P., 1896, 143.
constitution of (JÜNGER and KLAGES), A., i, 244.
behaviour of, towards sulphuric acid (TOLLOCZKO), A., i, 381.
sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- Menthol, 4-amino-, acetate (TIEMANN and KRÜGER), A., i, 384.
thio- (VOSWINKEL), A., i, 379.
- Menthol, tertiary, from menthene and trichloroacetic acid (MASSON and REYCHLER), A., i, 620.
- Menthonaphthene identical with hexahydrocymene (JÜNGER and KLAGES), A., i, 245.
- Menthone, constitution of (BECKMANN), A., i, 312; (BARBIER and BOUVEAULT), A., i, 492.
heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
oxidation of (BECKMANN and MEHL-LÄNDER), A., i, 312.

- Menthone, 4-amino-, acetyl derivative (TIEMANN and KRÜGER), A., i, 384.
- dibromo- (BECKMANN and EICKELBERG), A., i, 313.
- nitro- (KONOWALOFF), A., i, 177.
- sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- d*-Menthone and its semicarbazone (BECKMANN), A., i, 312.
- l*-Menthone, inversion of, and its semicarbazone (BECKMANN), A., i, 311.
- Menthonementhylhydrazone (KIJNER), A., i, 178.
- Menthoneoxime from rhodinaldoxime (BARBIER and BOUVEAULT), A., i, 491.
- d*-Menthoneoxime (BECKMANN), A., i, 311.
- behaviour of, towards phosphorus pentachloride (BECKMANN and MEHRLÄNDER), A., i, 312.
- l*-Menthoneoxime (BECKMANN), A., i, 312.
- behaviour of, towards phosphorus pentachloride and concentrated sulphuric acid (BECKMANN and MEHRLÄNDER), A., i, 312.
- Menthoximic acid, sodium, copper, silver, ethylic salts, and acetyl derivative (BECKMANN and MEHRLÄNDER), A., i, 312.
- Menthylamine, dibromo-, behaviour of, towards hydroxylamine (KIJNER), A., i, 178.
- Menthylhydrazine hydrochloride (KIJNER), A., i, 178.
- Menthyllic acid, oxy-. See Oxymenthyllic acid.
- Menthyllic chloride, conversion of, into menthene (MASSON and REYCHLER), A., i, 620.
- Mercaptans (Thiols). See:—
- Benzylic hydrosulphide.
 - Diazobenzenemercaptohydrosulphide.
 - Diazophenol hydrosulphide.
 - 1 : 5-Diphenylthiobenzolone hydrosulphide.
 - Ethylthiazoline hydrosulphide.
 - α -Naphthyl mercaptan.
 - Phenyl mercaptan, *o*-amino-
 - Thiocresol (tolyl mercaptan).
 - Thioeugenol.
 - Thioguaiacol.
 - Thionaphthol (naphthyl mercaptan).
 - Thiophenol (phenyl mercaptan).
 - Thioresorcinol.
 - Thiothymol.
 - o*- and *p*-Tolyl mercaptans.
- Mercury, line and band spectra of (EDER and VALENTA), A., ii, 2.
- Mercury, specific heat of (BARTOLI and STRACCIATI), A., ii, 145.
- solution and diffusion of metals and alloys in (HUMPHREYS), T., 250, 1679; P., 1896, 220; (ROBERTS-AUSTEN), P., 1896, 9, 219.
- Mercury haloid salts, rate of sublimation of (ARCTOWSKI), A., ii, 635.
- amidosulphonates (DIVERS and HAGA), T., 1649; P., 1896, 180.
- imidosulphonates (DIVERS and HAGA), T., 1627; P., 1896, 179.
- thiophosphite (FERRAND), A., ii, 418.
- Mercuric chloride, electrical conductivity of solutions in acetone of (LASZCZYNSKI), A., ii, 555.
- electrolytic dissociation of, in alcoholic solution (SALVADORI), A., ii, 512.
- action of iodoform on (SCHUYTEN), A., ii, 524.
- basic, artificial dendrites of (ARCTOWSKI), A., ii, 649.
- silver iodide, decomposition of, by heat (BAUR), A., ii, 146.
- oxide, identity of red and yellow (OSTWALD and MARK), A., ii, 142.
- oxy-salts, condition of, in solution (VARET), A., ii, 648.
- sulphates, equilibria between normal and hydrated basic (HOITSEMA), A., ii, 15.
- cyanide, thermochemical data of compounds of metallic bromides with (VARET), A., ii, 88.
- thermochemical data of compounds of metallic iodides with (VARET), A., ii, 148.
- combination of, with bromides and iodides (VARET), A., i, 113.
- compounds of, with metallic chlorides, composition of (VARET), A., i, 3.
- interaction of, with salts of metals of the alkalis or alkaline earths (VARET), A., i, 113.
- iodoform and alcohol, action of heat on (LONGI and MAZZOLINO), A., i, 517.
- detection of, in toxicology (VITALI), A., ii, 628.
- oxycyanides (BARTHE), A., i, 330, 331.
- Mercurous and mercuric chlorides, mutual conversion of (HADA), T., 1675; P., 1896, 183.
- nitrates, mutual conversion of (HADA), T., 1667; P., 1896, 182.

MERCURY:—

- Mercurous and mercuric phosphates, mutual conversion of (HADA), T., 1673; P., 1896, 182.
- sulphates, mutual conversion of (HADA), T., 1672; P., 1896, 182.
- acetates, perchlorates, and oxalates, mutual conversion of (HADA), T., 1674; P., 1896, 183.
- Mercurous iodide, decomposition of, by heat (FRANÇOIS), A., ii, 363.
- decomposition of, when dissolved in boiling alcohol (FRANÇOIS), A., ii, 301.
- decomposition of, when dissolved in boiling phenol (FRANÇOIS), A., ii, 248.
- action of aniline on. See Aniline.
- nitrite (RÂY), A., ii, 649.
- oxide and carbonate, decomposition of (HADA), T., 1677; P., 1896, 183.
- thiopyrophosphate (FERRAND), A., ii, 473.
- sulphide, decomposition of (HADA), T., 1678.
- allylide (KEISER), A., i, 458.
- Mercurypyridines. See Pyridines, mercurio-.
- Mercury, detection of (JANNASCH and LEHNERT), A., ii, 545.
- estimation of, in cinnabar by electrolysis (RISING and LENHER), A., ii, 338.
- estimation and detection of, in urine (JOLLES), A., ii, 77.
- separation of, from other metals (JANNASCH and LEHNERT), A., ii, 546.
- separation of, from arsenic, antimony, and copper by ignition (JANNASCH), A., ii, 675.
- separation of, electrolytically from cadmium (SMITH and WALLACE), A., ii, 220.
- separation of, from organic mixtures (JANNASCH and LEHNERT), A., ii, 546.
- Meroquinene (merochinine) (KOENIGS), A., i, 63.
- action of bromine water on (KOENIGS), A., i, 64.
- Meroquinene, bromo- (KOENIGS), A., i, 64.
- Mesaconic acid, rotatory power of the amylic salt of (WALDEN), A., ii, 633.
- heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.

- Mesaconic acid, sublimation temperature of, under small pressure (KRAFFT and DYES), A., ii, 89.
- diethylic salt, action of alcoholic ammonia on (KÖRNER and MENOZZI), A., i, 205.
- Mesaconic acid, bromo-, silver salt of (MICHAEL), A., i, 132.
- melting point and solubility of (MICHAEL and TISSOT), A., i, 132.
- Mesidine, nitro-, preparation of (HOFMANN LECTURE), T., 694.
- oxyphosphazo-compound of (MICHAELIS and SILBERSTEIN), A., i, 345.
- Mesitolole. See Mesitylene.
- Mesityl methyl ketone, preparation of (LUCAS), A., i, 418.
- Mesityl oxide (*methyl isobutenyl ketone*, *isopropylideneacetone*), reduction of (HARRIES and ESCHENBACH), A., i, 306; (KERP), A., i, 448.
- semicarbazone, products of distillation of (SCHOLTZ), A., i, 343.
- Mesitylantialdoxime (LUCAS), A., i, 418.
- Mesityldiazonium triiodide (HANTZSCH), A., i, 93.
- Mesitylene from acetophorone (KERP), A., i, 448.
- synthesis of (LUCAS), A., i, 418.
- composition of (HOFMANN LECTURE), T., 694.
- magnetic rotatory power, &c., of (PERKIN), T., 1064, 1130, 1193, 1241.
- Mesitylene, tribromo-, discovery of (HOFMANN LECTURE), T., 694.
- cyano- (BAUM), A., i, 222.
- nitro-, heat of combustion of (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 675.
- ω*-nitro- (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- labile form of (KONOWALOFF), A., i, 675.
- dinitro-, preparation of (HOFMANN LECTURE), T., 634.
- heat of combustion of (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 675.
- ω*-*o*-di-nitro- (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- ω*-*o*-*p*-trinitro- (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- ω*-*o*-*o*-trinitro- (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- Mesitylenecarboxylic acid. See *β*-isocuminic acid.

- Mesitylencsulphonic acid, discovery of (HOFMANN LECTURE), T., 694.
- Mesitylenic acid, *o*-nitro- (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- d*-nitro-, derivatives of (KONOWALOFF, KIKINA, and TSCHITSCHKIN), A., i, 674.
- Mesitylglyoxylic acid, preparation of (LUCAS), A., i, 418.
- behaviour of, towards hydroxylamine (BAUM), A., i, 222.
- formation of oximes from salts of (MEYER), A., i, 433.
- α -Mesityloxidoxalic acid (CLAISEN, TINGLE, and KERSTIENS), A., i, 561.
- ethereal salts, molecular refraction and dispersion of (BRÜHL), A., i, 522.
- methylic and ethylic salts of (CLAISEN, TINGLE, and KERSTIENS), A., i, 561.
- β -Mesityloxidoxalic acid (CLAISEN, TINGLE, and KERSTIENS), A., i, 561.
- methylic and ethylic salts of (CLAISEN, TINGLE, and KERSTIENS), A., i, 561.
- Mesoxylic acid, tetramethylic salt of (BISCHOFF), A., i, 468.
- Mespilus germanica*, composition of (BERSCH), A., ii, 383.
- Metabolism, laws of (MUNK), A., ii, 43.
- action of dilute acids on (DUNLOP), A., ii, 484.
- action of the vasomotor nerves on (TANGL), A., ii, 43.
- influence of fat and starch on (WICKE and WEISKE), A., ii, 535.
- proteid, influence of muscular work on (KRUMMACHER), A., ii, 377.
- in poisoning by carbonic oxide and nitrobenzene (MÜNZER and PALMA), A., ii, 662.
- Metallic bases, constitution of (KURNAKOFF), A., ii, 170.
- Metals, use of electro-dissolution in purifying (WARREN), A., ii, 249.
- phenomena accompanying the discharge of electricity through the vapours of (WIEDEMANN and SCHMIDT), A., ii, 348.
- thermo-electromotive force of (DEWAR and FLEMING), A., ii, 4.
- separated from their amalgams, properties of (GUNTZ), A., ii, 421.
- compounds of oxyhæmoglobin with heavy (JUTT), A., i, 584.
- Metamaltose. See under Maltose.
- Metasantoninic acid. See under Santonic acid.
- Metasantonin. See under Santonin.
- Meteorite from Cherokee mills, Georgia (HOWELL), A., ii, 193.
- from Costilla, New Mexico (HILLS), A., ii, 614.
- from El Capitan range, New Mexico (HOWELL), A., ii, 193.
- from Forsyth Co., N. Carolina (SCHWEINITZ), A., ii, 375.
- from Godhaven, Disko Island (GOLD-SMITH), A., ii, 41.
- from Lesves, Belgium (RENARD), A., ii, 614.
- from Moonbi, Tamworth, N.S.W. (MINGAYE), A., ii, 193.
- from Smithville (HUNTINGTON), A., ii, 484.
- Meteorites, amorphous carbon, graphite, and diamond in (MOISSAN), A., ii, 194.
- Methæmoglobin. See Hæmoglobin.
- Methane, possible occurrence of, in air (PHILLIPS), A., ii, 162.
- synthesis of, from carbon and hydrogen of (BOXE and JORDAN), P., 1896, 61.
- oxidation of, by palladinised copper oxide (CAMPBELL), A., ii, 171.
- explosive mixtures of air and (CLOWES), P., 1895, 201.
- combustion of, in presence of nitrogen (DUNSTAN and CARR), P., 1896, 48.
- estimation of, in presence of hydrogen (GILL and HUNT), A., ii, 341.
- See also Marsh gas.
- Methane, bromonitro- (SCHOLL), A., i, 585.
- dibromonitro- (SCHOLL), A., i, 585.
- trichloronitro-, melting point of (v. SCHNEIDER), A., ii, 290.
- nitro-, behaviour of, towards phenylhydrazine (WALTHER), A., ii, 542.
- Methaneazobenzene, nitro-, formation of (MICHAEL), A., i, 594.
- Methanedisulphonic acid, amino-, potassium salts of (VON PECHMANN and MANCK), A., i, 14, 15.
- iodo-, dipotassium salt of (VON PECHMANN and MANCK), A., i, 15.
- diiodo-, dipotassium salt of (VON PECHMANN and MANCK), A., i, 15.
- Methanesulphonepropionic acid, β -dibromo-, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- β -dichloro-, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Methenehydrazone, remarks on constitution of (WALKER), T., 1286.
- Methenyl-*o*-aminothiophenol, preparation of (HOFMANN LECTURE), T., 712, 713.

- Methenyl-*o*-aminothiophenol, amyloiodide, colouring matter obtained from (HOFMANN LECTURE), T., 714.
chloro-, preparation of (HOFMANN LECTURE), T., 712.
- Methoethylheptanonolide from α -pinonic acid (VON BAEYER), A., i, 308.
from pinonic acid (TIEMANN and SEMMLER), A., i, 309.
a source of terpenylic acid (MAHLA and TIEMANN), A., i, 385.
- Methoxyaerylic acids, α -*o*- and β -*o*-, magnetic rotatory powers, &c., of the methylic salts of (PERKIN), T., 1147, 1228, 1247.
- Methoxyaposafranone (FISCHER and HEPP), A., i, 323.
- o*-Methoxybenzaldehyde (*methylsalicylaldehyde*), magnetic rotatory power, &c., of (PERKIN), T., 1127, 1128, 1200, 1243.
- m*-Methoxybenzaldehydehydrazone (BOUVEAULT), A., i, 650.
- o*-Methoxybenzanilide (*methylsalicylanilide*) (HALLER), A., i, 32.
- o*-Methoxybenzoic acid (*methylsalicylic acid*), magnetic rotatory power, &c., of the ethylic salt of (PERKIN), T., 1127, 1128, 1130, 1160, 1176, 1231, 1238.
phenylglyoxylamide of (MINOVICI), A., i, 705.
- m*-Methoxybenzoic acid, magnetic rotatory power, &c., of the ethylic salt of (PERKIN), T., 1130, 1177, 1238.
- o*-Methoxybenzophenone and its benzoate, phenylhydrazone, and oxime (COHN), A., i, 440.
- o*-Methoxybenzylic alcohol (*methylsalicylic alcohol*), magnetic rotatory power, &c., of (PERKIN), T., 1128, 1198, 1242.
- Methoxybenzylidenemandelamide. See Mandelic acid, methoxybenzylidenamide of.
- Methoxybromomethoxypropylbenzene (HELL and HOLLENBERG), A., i, 354.
- Methoxy- ψ -eumenol, dibromo- (AUWERS), A., i, 149; (AUWERS and MARWEDEL), A., i, 150.
benzoate (AUWERS and MARWEDEL), A., i, 150.
- o*-Methoxydiphenylamine, diamino- (FISCHER), A., i, 628.
dinitro- (FISCHER), A., i, 628.
- 1'-Methoxyindole-2'-carboxylic acid (REISERT), A., i, 390.
3'-bromo- (REISERT), A., i, 390.
- Methoxy- ψ -isatin and its phenylhydrazone (REISERT), A., i, 390.
- 3-Methoxynaphthalene (THIELE and MEYER), A., i, 407.
- μ -Methoxypentthiazoline, γ -bromo- (DIXON), T., 32; P., 1895, 217.
- Methoxyphenazine, *syn-p*-amino- (FISCHER), A., i, 628.
- Methoxyphenyl ethyl ketone, *mono*-, *di*-, and *tri*-bromo- (HELL and HOLLENBERG), A., i, 354.
- o*-Methoxyphenylcrotonic acid (MOUREU), A., i, 647.
- m*-Methoxyphenylcrotonic acid (MOUREU), A., i, 647.
- 3'-*o*-Methoxyphenylketotetrahydroquinazoline (BUSCH, BRUNNER, and BIRK), A., i, 160.
- p*-Methoxyphenylmalonamic acid and its ethylic salt (CASTELLANETA), A., i, 368.
- p*-Methoxyphenyloxamic acid and its ethylic salt (CASTELLANETA), A., i, 368.
- β -Methoxy- β -phenylpropionic acid, α -iodo- (ERLENMEYER), A., i, 302.
- β -Methoxyphenyl- μ -propylphenyloxazole and its salts (MINOVICI), A., i, 704.
- β -Methoxyphenyl- μ -styryloxazole and its salts (MINOVICI), A., i, 704.
- p*-Methoxyphenylsuccinamic acid (PIUTTI), A., i, 223.
- p*-Methoxyphenylsuccinimide (PIUTTI), A., i, 223.
compound of, with potassium iodide and iodine (PIUTTI), A., i, 364.
- 3'-*o*-Methoxyphenylthiotetrahydroquinazoline (BUSCH, BRUNNER, and BIRK), A., i, 160.
- 1' : 3'-Methoxypropylisoquinoline and its salts (ALBAHARY), A., i, 699.
- 3-Methoxyquinoline, 4'-amino-, and its salts (HIRSCH), A., i, 626.
4'-chloro-, and its salts (HIRSCH), A., i, 626.
- p*-Methoxytriphenyltetrazolium chloride (WEDEKIND), A., i, 631.
- ω -Methoxy-1 : 3 : 4-xyleneol, *tribromo*- (AUWERS and CAMPENHAUSEN), A., i, 424.
- Methyl anilidobutyl ketone, platinochloride of, and its oxime and phenylhydrazone (LIPP), A., i, 317.
- Methyl benzamidobutyl ketone and its oxime (LIPP), A., i, 317.
- Methyl isobutenyl ketone. See Mesityl oxide.
- Methyl butyl ketone, heat of evaporation of (LONGUININE), A., ii, 146.
- Methyl isobutyl ketone (GLÜCKSMANN), A., i, 333.
- Methyl *tert*-butyl ketone, uncertainty as to the identity of pinacolone with (DELACRE), A., i, 591, 662.

- Methyl chloro-*sec-isobutyl* ketone (KONDAKOFF), A., i, 462.
- Methyl chloropropyl ketone (KONDAKOFF), A., i, 462.
- Methyl ethyl ketone, heat of evaporation of (LUGININ), A., ii, 146.
products of distillation of the semicarbazone of (SCHOLTZ), A., i, 343.
- Methyl α -ethylpropyl ketoxime (BORN), A., i, 199.
- Methyl hexyl ketone (BORN), A., i, 199.
- Methyl hydroxyethyl ketone, α -dibromo- (WOLFF and SCHWABE), A., i, 522.
tri-bromo-, and its behaviour with sodium carbonate (WOLFF and SCHWABE), A., i, 522.
- Methyl propenyl ketone (KONDAKOFF), A., i, 462.
- Methyl propyl ketone, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
products of distillation of the semicarbazone of (SCHOLTZ), A., i, 343.
- Methyl isopropyl ketone, heat of evaporation of (LUGININ), A., ii, 146.
- Methyl propylidene-ethyl ketone (KONDAKOFF), A., i, 462.
- Methyl isopropyl ketone (IPATIEFF), A., i, 401.
- Methylacetoacetic acid, ethylic salt, action of sodium ethoxide and bromethylphenyl ether on (BENTLEY, HAWORTH, and PERKIN), T., 172; P., 1896, 36.
condensation of, with ethylic chlorofumarate (RUHEMANN and WOLFF), T., 1384; P., 1896, 166.
rate of formation of (BISCHOFF), A., i, 85.
products of the bromination of (FREER), A., i, 277.
methylic salt, action of bromine on (CONRAD and KREICHGAUER), A., i, 409.
- Methylacetoacetic acid, bromo-, ethylic salts, oxidation of (FREER), A., i, 277.
 α -bromo-, methylic salt (CONRAD and KREICHGAUER), A., i, 409.
- Methylacetonedicarboxylic acid, ethylic salt of: its compound with phenylhydrazine (PETRENKO-KRITSCHENKO and KHRUSI), A., i, 135; (PETRENKO-KRITSCHENKO), A., i, 258.
- Methylacetylene. See Allylene.
- β -Methyladipic acid from citronellaldehyde (BARBIER and BOUVEAULT), A., i, 492.
from 2:6-dimethyloctan-3-oleic acid (VON BAAYER), A., i, 247.
- β -Methyladipic acid from oxidation of rhodinol (BARBIER and BOUVEAULT), A., i, 446.
- d*- β -Methyladipic acid from citronellaldehyde (TIEMANN and SCHMIDT), A., i, 383.
- l*- β -Methyladipic acid from rhodinol (TIEMANN and SCHMIDT), A., i, 384.
- Methylal, heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- Methylallyldithiourazole: its hydrochloride and acetyl derivative (FREUND and HEILBRUN), A., i, 415.
- Methylallylhexenylcarbinol. See Hendecynyl alcohols.
- μ -Methylallylsuccinic acid, conversion of, into paramethylcarbocaprolactonic acid (HJELT), A., i, 600.
- para*-Methylallylsuccinic acid, conversion of, into paramethylcarbocaprolactonic acid (HJELT), A., i, 600.
- Methylallylthiocarbamide, action of bromine on (DIXON), T., 852.
dibromide of (GADAMER), A., i, 140.
chlorobromide of (GADAMER), A., i, 140.
- Methylamine, discovery of (HOFMANN LECTURE), T., 656.
preparation of, from formaldehyde and ammonium chloride (BROCHET and CAMBIER), A., i, 7; (TRILLAT), A., i, 407.
hydrochloride (LUXMOORE), T., 184; (DELÉPINE), A., i, 589.
picrate (DELÉPINE), A., i, 589.
- Methylamine, nitroso- (THIELE and MEYER), A., i, 407.
- Methylamines, separation of, by means of formaldehyde (DELÉPINE), A., i, 519, 520.
- Methylaminoformic acid, methylic and ethylic salts, action of nitric acid on (FRANCHIMONT), A., i, 602.
- 5-Methylamino-1-methyltetrazole: its aurochloride and platinochloride (THIELE and INGLE), A., i, 108.
- Methylamylacetylene. See Oetinene.
- Methylisoamylamine and its salts (STOERMER and VON LEPEL), A., i, 664.
benzoyl derivative (STOERMER and VON LEPEL), A., i, 664.
methylisoamylidithiocarbamate (STOERMER and VON LEPEL), A., i, 664.
nitroso-derivative (STOERMER and VON LEPEL), A., i, 664.
- Methylamylaminoacetone and its methiodide (STOERMER and POGGE), A., i, 408.

- Methylisoamylcarbamide (STOERMER and VON LEPEL), A., i, 664.
- Methylanemonin. See Anemonin.
- Methylaniline (HOFMANN LECTURE), T., 598.
- preparation of (HOFMANN LECTURE), T., 624, 625.
- magnetic rotatory power, &c., of (PERKIN), T., 1099, 1207, 1244.
- Methylaniline, bromonitro- (EVANS), P., 1895, 236.
- tribromo- (EVANS), P., 1895, 235.
- nitramino-, azoimide from (ZINCKE and HELMERT), A., i, 301.
- Methylanilines, colouring matters obtained from (HOFMANN LECTURE), T., 623.
- Methylazimidobenzoic acid (ZINCKE and HELMERT), A., i, 550.
- o*-Methylazobenzene (JACOBSON and LISCHKE), A., i, 96.
- m*-Methylazobenzene (JACOBSON and NANNINGA), A., i, 97.
- Methylbenzaconide, formation of (DUNSTAN, TICKLE, and JACKSON), P., 1896, 159.
- salts of, hydrolysis of (DUNSTAN, TICKLE, and JACKSON), P., 1896, 160.
- N*-Methylbenzantialdoxime and its hydrobromide (LUXMOORE), T., 183; P., 1895, 149.
- hydriodide (LUXMOORE), T., 185.
- N*-Methylbenzsynaldoxime and its hydrobromide (LUXMOORE), T., 184, 185; P., 1895, 149.
- Methylbenzamide imidochloride (VON PECHMANN), A., i, 31.
- 1 : 3 : 4-Methylbenzenedicarboxylic acid. See α -Methylphthalic acid.
- Methylantibenzhydroximic acid, phosphate, and benzenesulphonate and benzoyl, dinitrophenyl, *p*-methoxybenzoyl, and carbanilido-derivatives (WERNER and SUBAK), A., i, 431.
- Methylsynbenzhydroximic acid and its benzoyl, dinitrophenyl, *p*-methoxybenzoyl, and carbanilido-derivatives (WERNER and SUBAK), A., i, 431.
- 2-Methylbenzidine: its hydrochloride and diacetyl, dibenzylidene and di-orthohydroxybenzylidene derivatives (JACOBSON and NANNINGA), A., i, 97.
- 3-Methylbenzidine and its dibenzylidene derivative (JACOBSON and LISCHKE), A., i, 97.
- Methylbenzoylpropionic acid (MUHR), A., i, 231.
- Methylbenzylamine: its pierate, acetyl, and benzoyl derivatives (LUSTIG), A., i, 163.
- m*-amino-, salts of (LUSTIG), A., i, 163.
- p*-Methylbenzylamine, nitro-, salts of (LUSTIG), A., i, 163.
- p*-Methylbenzylbenzamide, *m*-nitro- (LUSTIG), A., i, 163.
- Methylbetainepyridine-3 : 4-dicarboxylic acid. See Apophyllenic acid.
- Methylbutylacetylene. See Heptinenes.
- Methylbutylamine (FRANCHIMONT and VAN ERP), A., i, 275.
- Methylisobutylamine and its salts (STOERMER and VON LEPEL), A., i, 662.
- benzoyl derivative (STOERMER and VON LEPEL), A., i, 664.
- methylisobutyldithiocarbamate (STOERMER and VON LEPEL), A., i, 663.
- Methylisobutylamine, nitroso- (STOERMER and VON LEPEL), A., i, 662.
- Methylbutylaminoacetone (STOERMER and POGGE), A., i, 408.
- m*-Methylisobutylbenzene, 2 : 4 : 6-*tri*-nitro- (KNOEVENAGEL), A., i, 288.
- Methylisobutylcarbamide (STOERMER and VON LEPEL), A., i, 662.
- Methylisobutylcarbinol. See Hexylic alcohols.
- 1 : 3-Methylisobutylcyclohexadiene (*m*-methylisobutyldihydrobenzene) (KNOEVENAGEL), A., i, 288.
- 5-chloro- (GUNDLICH and KNOEVENAGEL), A., i, 213.
- 1-Methyl-3-isobutylcyclohexanone, action of phosphorus pentachloride on (GUNDLICH and KNOEVENAGEL), A., i, 212.
- 1 : 3-Methylisobutylcyclohexenol-5 and its acetyl derivative, methylic ether and isopropyl ether (KNOEVENAGEL), A., i, 287.
- 3 : 5-Methylisobutyl- Δ_2 -cyclohexenone : its oxime, benzoyl derivatives, and its phenylhydrazone (KNOEVENAGEL), A., i, 211.
- 3 : 5-Methylisobutyl- Δ_2 -cyclohexenone-4-carboxylic acid, ethylic salt of : its oxime and benzoyl derivatives (KNOEVENAGEL), A., i, 211.
- 3 : 5-Methylisobutyl- Δ_2 -cyclohexenone-6-carboxylic acid, ethylic salt of, phenylhydrazone of (KNOEVENAGEL), A., i, 211.
- 3 : 5-Methylisobutyl- Δ_2 -cyclohexenone, 4 : 6-dicarboxylic acid, ethylic salt of : its oxime and benzoyl derivatives (KNOEVENAGEL), A., i, 211.
- Methylbutylhydrazine (FRANCHIMONT and VAN ERP), A., i, 275.
- Methylisobutylhydrazine, carbamide of (STOERMER and VON LEPEL), A., i, 664.

- Methylisobutylketotetrahydrobenzene.
See Methylisobutylcyclohexenone.
- Methylbutylnitramine, reduction products of (FRANCHIMONT and VAN ERP), A., i, 275.
- Methylbutylnitrosamine (FRANCHIMONT and VAN ERP), A., i, 275.
- Methylbutyloxamic acid (FRANCHIMONT and VAN ERP), A., i, 275.
- 3 : 5-Methylisobutylphenol (KNOEVENAGEL), A., i, 211.
- tribromo- (KNOEVENAGEL), A., i, 211.
- Methylbutyltetrazone (FRANCHIMONT and VAN ERP), A., i, 275.
- α -Methylbutyric acid. See Valeric acids.
- Methylbutyrolactones. See Valerolactones.
- Methyl- β -camphoramie acid, from camphormethylimide (HOOGWERFF and VAN DORP), A., i, 314.
- Methylearbamide, action of benzaldehyde on (SCHIFF), A., i, 530.
- μ -Methylearboeaprolactonic acid, barium salt (HJELT), A., i, 600.
- para*-Methylearboeaprolactonic acid, barium salt (HJELT), A., i, 600.
- α -Methylearboxyglutaric acid. See Butane- $\alpha\gamma\gamma$ -tricarboxylic acid.
- Methyleitraconic acid (SPENZER), A., i, 128.
- Methyleusparine (BECKURTS), A., i, 66.
- Methyl-desmotroposantonin, preparation and properties of (ANDREOCCI), A., i, 182.
- Methylisodesmotroposantonin (ANDREOCCI), A., i, 182.
- reduction of (ANDREOCCI), A., i, 184.
- Methyl-desmotroposantonous acid and its ethylic salt (ANDREOCCI), A., i, 185.
- Methyldiethenyltetraminobenzene and its mercuriochloride (SCHUSTER and PINNOW), A., i, 428.
- Methyldiethylamine, preparation of (HOFMANN LECTURE), T., 670.
- Methyldiethylamylammonium hydroxide, action of heat on (HOFMANN LECTURE), T., 666.
- Methyldiethylisoamylammonium platinochloride, crystalline form of (HOFMANN LECTURE), T., 671.
- 2-Methyldihydrofurfuran-3 : 4-dicarboxylic acid, ethylic salt (RUHEMANN and WOLFF), T., 1393.
- 2-Methyldihydrofurfuran-3 : 4-dicarboxylic acid, ethylic salt of (RUHEMANN and WOLFF), T., 1392.
- 2-Methyldihydrofurfuran-3 : 4 : 5-tricarboxylic acid, ethylic salt (RUHEMANN and TYLER), T., 532; P., 1896, 73.
- m*-Methyldihydroresoreinol. See 3 : 5 : 1-Dihydroxymethylcyclohexadiene.
- p*-Methyldihydroxybenzenesulphonic acid and its ammonium salt (JONES), A., i, 50.
- 5-Methyl-1 : 3-diketocyclohexane-4 : 6-dicarboxylic acid, diethyl salt of (KNOEVENAGEL), A., i, 289.
- 2-Methyl-4 : 6-dioxytriazine (*aceto-guanamide*) and its hydrochloride and platinochloride, its silver and lead derivatives (OSTROGOVICH), A., i, 261, 393.
- tribromo- (OSTROGOVICH), A., i, 262.
- Methyldiphenyl. See Phenyltoluene.
- Methyldiphenylamine, magnetic rotatory power, &c., of (PERKIN), T., 1101, 1157, 1208, 1232, 1244.
- α -Methyl- γ -diphenylitaconic acid and its monethyl salt (STOBBE), A., i, 235.
- Methyl- α -eegonine, benzoyl derivative of (WILLSTÄTTER), A., i, 708.
- methiodide, formation of, and its salts (WILLSTÄTTER), A., i, 708.
- Methyleneaminoacetonitrile (CURTIUS), A., i, 337.
- Methylenebisacetonedicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 212.
- Methylene-blue, detection of, in wines (BELAR), A., ii, 630.
- Methylenecaffeic acid, bromo-, preparation of, and its silver salt (MOUREU), A., i, 477.
- o*-Methylenedioxybenzene (MOUREU), A., i, 477.
- Methylenediurethane (CURTIUS), A., i, 35.
- Methylenemucic acid (HENNEBERG and TOLLENS), A., i, 645.
- Methylenepentaglycol (APEL and TOLLENS), A., i, 115.
- 1 : 4-Methylenepiperazine (ROSDALSKY), A., i, 257.
- Methylenesaccharic acid and the action of alkalis on (HENNEBERG and TOLLENS), A., i, 645.
- ethylic salt (HENNEBERG and TOLLENS), A., i, 645.
- Methylenetartaric acid (HENNEBERG and TOLLENS), A., i, 645.
- Methylene, trioxo-. See Trioxymethylene.
- Methylene diiodide, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
- diiodide and dichloride, action of sodium phenoxide on (BENTLEY,

- HAWORTH, and PERKIN), T., 166, 167.
- Methylethenylacetamidophenylene-amidine (SCHUSTER and PINNOW), A., i, 427.
- nitro- (SCHUSTER and PINNOW), A., i, 428.
- Methylethenylaminophenyleneamidine and its pierate (SCHUSTER and PINNOW), A., i, 427.
- Methylethenyldiazophenyleneamidine, colouring matter obtained from, with β -naphthylamine (SCHUSTER and PINNOW), A., i, 428.
- Methylethenylphenyleneamidine, nitramino- (SCHUSTER and PINNOW), A., i, 428.
- Methylethylacetaldehyde. See Valeraldehyde.
- Methylethylacetic acid. See Valeric acids.
- Methylethylacroleinanthranilic acid (NIEMENTOWSKI and ORZECOWSKI), A., i, 187.
- Methylethylbenzene (*p*-ethyltoluene), preparation of (BAYRAC), A., i, 474.
- o*-bromo- (DEFREN), A., i, 90.
- di*bromo- (DEFREN), A., i, 91.
- ch*loro- (DEFREN), A., i, 90.
- di*chloro- (DEFREN), A., i, 90.
- Methylethylbenzenesulphonamide (DEFREN), A., i, 90.
- o*-bromo- (DEFREN), A., i, 91.
- Methylethylbenzenesulphonic acid and salts (DEFREN), A., i, 90.
- o*-bromo-, and salts (DEFREN), A., i, 91.
- ch*loro-, and salts (DEFREN), A., i, 91.
- Methylethylbenzenesulphonic chloride (DEFREN), A., i, 90.
- o*-bromo- (DEFREN), A., i, 91.
- ch*loro- (DEFREN), A., i, 91.
- Methylethylbenzene-*o*-sulphonic acid, barium salt of (BAYRAC), A., i, 474.
- Methylethylbenzene-*m*-sulphonic acid, barium salt of (BAYRAC), A., i, 474.
- Methylethylbenzonitrile (DEFREN), A., i, 90.
- Methylethylene- ψ -thiocarbamide. See Propylene- ψ -thiocarbamide.
- Methylethylene- ψ -thiourea, hydrobromide of (DIXON), T., 23.
- Methylethylene. See Amylene.
- Methylethylhydantoin (*ethyl*lactylcarbamide) (DUVILLIER), A., i, 89.
- 4 : 2-Methylethylphenol (*p*-ethyl-*o*-resol) (BAYRAC), A., i, 474.
- 4 : 3-Methylethylphenol (*p*-ethyl-*m*-resol) (BAYRAC), A., i, 474.
- 2 : 5-Methylethylpiperidine. See Copelidine.
- 1-Methylethyl-4-*isopropyl*benzene (*ethylcymene*), preparation of (BOUVEAULT), A., i, 616.
- Methyl- α -ethylpropylmethane. See Heptane.
- 2 : 5-Methylethylpyridine. See Colidine.
- 3 : 2-Methylethylpyridine from meroquinene (KOENIGS), A., i, 63.
- 3'-Methyl-2'-ethylquinoline (NIEMENTOWSKI and ORZECOWSKI), A., i, 188.
- 3'-Methyl-2'-ethylquinoline-1-carboxylic acid (NIEMENTOWSKI and ORZECOWSKI), A., i, 187.
- Methylethylsuccinic acid (MICHAEL), A., i, 597.
- Methylethylsuccinic acid, asymmetric, and its *p*-tolil (AUWERS and SCHLOSSER), A., i, 640.
- Methyleugenol, synthesis of (MELDOLA, WOOLCOTT, and WRAY), T., 1321.
- δ -Methylfurfuraldehyde (FISCHER and HERBORN), A., i, 588.
- oxide (KIERMAYER), A., i, 144.
- aldoxime of (KIERMAYER), A., i, 145.
- anilide of (KIERMAYER), A., i, 144.
- phenylhydrazone of (KIERMAYER), A., i, 144.
- Methylfurfurandicarboxylic acid, ethylic salt of (RUHEMANN and WOLFF), T., 1388; P., 1896, 166.
- α -Methylglutaranil, bimolecular (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaranilic acids (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaric acid and its anhydride (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaro- β -naphthil, bimolecular (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaro- β -naphthilic acid (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaro-*p*-tolil, bimolecular (AUWERS and TITHERLEY), A., i, 642.
- α -Methylglutaro-*p*-tolilic acids (AUWERS and TITHERLEY), A., i, 642.
- Methylglyoxime (HANTZSCH and WILD), A., i, 285; (SCHOLL and MATTHAIPOULOS), A., i, 520.
- Methylgranatoline, oxidation of (CIAMICIAN and SILBER), A., i, 397.
- Methyl- ϵ -heptadiene, 1 : 3-. See Octinenes

- Methylheptenone, natural, source of (BARBIER and BOUVEAULT), A., i, 55.
 and its semicarbazone (BARBIER and BOUVEAULT), A., i, 638.
 behaviour of, towards ethylic iodoacetate (BARBIER and BOUVEAULT), A., i, 445.
n-Methylhexahydrocinchoimeronic acid (KOENIGS and WOLFF), A., i, 699.
 Methylcyclohexane (*hexahydrotoluene*) (ZELINSKY and GENEROSOFF), A., i, 351.
m-iodo- (WALLACH), A., i, 310.
cis-p-Methylcyclohexanecarboxylic acid (*cis-hexahydro-p-toluic acid*), *exo*-amino-, and its salts (EINHORN), A., i, 551.
 1 : 2-Methylcyclohexanol (ZELINSKY and GENEROSOFF), A., i, 350.
 1 : 3-Methylcyclohexanol (WALLACH), A., i, 310.
 1 : 2-Methylcyclohexanone (ZELINSKY and GENEROSOFF), A., i, 350.
 1 : 3-Methylcyclohexanone from *isopulegone* (TIEMANN and SCHMIDT), A., i, 383.
 from *pulegone* and formic acid, semicarbazone and oxime (WALLACH), A., i, 309.
 oxidation of (WALLACH), A., i, 310.
*di*isonitroso-, diacetate (VON BAEYER), A., i, 445.
*tri*isonitroso-, anhydride, and its acetate (VON BAEYER), A., i, 445.
 Methylcyclohexene (*tetrahydrotoluene*) from *m*-iodohexahydrotoluene (WALLACH), A., i, 310.
 1 : 3-Methylcyclohexenol and its acetyl derivative, urethane, and chloride (KNOEVENAGEL), A., i, 287.
 1 : 3-Methylhexylcyclohexadiene (1 : 3-*methylhexyldihydrobenzene*) (KNOEVENAGEL), A., i, 289.
 5-chloro- (GUNDLICH and KNOEVENAGEL), A., i, 213.
 1 : 3-Methylhexylcyclohexenol-5 and its acetyl derivative, methyl ether (KNOEVENAGEL), A., i, 287.
 3 : 5-Methylhexyl- Δ_2 -cyclohexenone: its oxime, benzoyl, and phenylhydrazone (KNOEVENAGEL), A., i, 211.
 3 : 5-Methylhexyl- Δ_2 -cyclohexenone-4-carboxylic acid, ethylic salt of: its oxime and benzoyl derivatives (KNOEVENAGEL), A., i, 211.
 3 : 5-Methylhexyl- Δ_2 -cyclohexenone-6-carboxylic acid, ethylic salt of, and its phenylhydrazone (KNOEVENAGEL), A., i, 211.
 3 : 5-Methylhexyl- Δ_2 -cyclohexenone-4-6-dicarboxylic acid, ethylic salt of: its oxime and benzoyl derivatives (KNOEVENAGEL), A., i, 211.
 Methylhexylmethane. See Octane.
 3 : 5-Methylhexylphenol (KNOEVENAGEL), A., i, 212.
tribromo- (KNOEVENAGEL), A., i, 212.
p-Methylhomatropine (MERCK), A., i, 65.
 Methylhydrastamide, physiological action of (FALK), A., ii, 201.
 Methylhydrastimide, physiological action of (FALK), A., ii, 201.
 Methylhydrazine (THIELE and MEYER), A., i, 407.
o-Methylhydrazobenzene (JACOBSON and LISCHKE), A., i, 96.
m-Methylhydrazobenzene (JACOBSON and NANNINGA), A., i, 97.
 Methylhydrocotoin, crystallography of (NEGRI), A., i, 655.
 β -Methylhydroxylamine hydrochloride (LUXMOORE), T., 183.
 Methylic alcohol, production of, from various woods (BARILLOT), A., i, 403.
 purification of (SCHALL), A., ii, 463.
 action of light on (RICHARDSON and FORTEY), T., 1351; P., 1896, 164.
 electrolytic conductivity of salts and acids dissolved in (CARRARA), A., ii, 511.
 heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 boiling point of solutions of salts in (WOELFER), A., ii, 237.
 products of the limited combustion of (BROCHET), A., i, 277.
 action of, on aconitine (DUNSTAN, TICKLE, and JACKSON), P., 1896, 159.
 influence of, in the nutrition of plants (KINOSHITA), A., ii, 54.
 Methylic $\alpha\beta$ -dibromallylic ether (LESPIEU), A., i, 332.
 Methylic iodide, preparation of (ORLOFF), A., i, 635.
 heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 action of hydroxylamine on (DUNSTAN and GOULDING), T., 839; P., 1896, 72.
 Methylic methylacetylenic ether and its bromo-derivative (LESPIEU), A., i, 332.
 Methylic nitrate, preparation of (DELÉPINE), A., i, 586.
 Methylic nitrosoferrocyanide (HOFMANN), A., i, 269.

- Methylic $\alpha\beta\beta$ -tribromopropyl ether (LESPIEU), A., i, 332.
- Methylic $\beta\beta\gamma$ -tribromopropyl ether (LESPIEU), A., i, 332.
- Methylimidazoline, action of phenylthiocarbimide on (DIXON), T., 34; P., 1895, 217.
- action of *o*-tolylthiocarbimide on (DIXON), T., 35; P., 1895, 217.
- Methylimidazolylphenylthiourea (DIXON), T., 34; P., 1895, 217.
- action of alkaline lead tartrate on (DIXON), T., 35; P., 1895, 217.
- Methylimidazolyl-*o*-tolylthiourea (DIXON), T., 35; P., 1895, 217.
- Methyliminophenylpropionic acid, ethylic salt (GOLDSCHMIDT), A., i, 231.
- Methylindazole; its nitrosamine and pierate (GABRIEL and STELZNER), A., i, 320.
- 1-amino-, and its dibenzoyl derivative (GABRIEL and STELZNER), A., i, 320.
- 4 : 1-chloramino-, and its acetyl derivative (GABRIEL and STELZNER), A., i, 320.
- 1-nitro- (GABRIEL and STELZNER), A., i, 320.
- Methylindophenazine and its 1'-acetyl derivative (SCHUNCK and MARCHLEWSKI), A., i, 236.
- ethylitaconic acid (SPENZER), A., i, 128.
- barium salt (FITTIG), A., i, 599.
- Methylketohexamethylene. See 1-Methyleyclohexenone.
- ethylketole. See Methyl hydroxyethyl ketone.
- Methylketoisooxazolone-4-phenylhydrazine (SCHIFF), A., i, 83.
- Methylketopentamethylene. See Methylcyclopentanone.
- Methyl- β -lactylcarbamide and its acetyl derivative (WEIDEL and ROITHNER), A., i, 470.
- action of hydrochloric acid on (WEIDEL and ROITHNER), A., i, 470.
- ethyllevulinic acid, ethylic salt, and potassium cyanide, action of sulphuric acid on (MONTEMARTINI), A., i, 367.
- ethyluteolin, preparation of (PERKIN), T., 211; P., 1896, 37.
- ethylmalonic acid (*iso-succinic acid*), ethereal salts, action of sodium ethoxide and ethylene dibromide on (BENTLEY, HAWORTH, and PERKIN), T., 162.
- ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
- Methylmalonic acid, ethylic salt, rate of hydrolysis of (HJELT), A., i, 598.
- action of ethylenic bromide on (BISCHOFF), A., i, 129.
- sodio-, ethylic salt, action of allylic salts of γ -chlorobutyric acid on (MONTEMARTINI), A., i, 667.
- action of bromo- or chloroethyl phenyl ether on (BENTLEY, HAWORTH, and PERKIN), T., 171; P., 1896, 36.
- action of ethylic α -bromopropionate, α -bromobutyrate, α -bromoisobutyrate, and α -bromisovalerate on (BISCHOFF), A., i, 467.
- action of methylic and ethylic chloromalonate and bromomalonate on (BISCHOFF), A., i, 527.
- action of ethylic β -iodopropionate on (AUWERS and TITHERLEY), A., i, 642.
- behaviour of, towards ethylic α -bromisovalerate (BENTLEY, PERKIN, and THORPE), T., 284; P., 1896, 65.
- action of *isopropyl* bromide on (PERKIN), T., 1477.
- action of trimethylene bromide on (BISCHOFF), A., i, 130.
- Methylmalonic anhydride, bromo-, action of aniline on (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Methylmesaconic acid. See Dimethylfumaric acid.
- 1 : 4-Methylmethoxyethyl-5-cyclohexanol, 4-amino-. See Menthol, amino-.
- 1 : 4-Methylmethoxyethyl-5-cyclohexanone, 4-amino-. See Menthone, amino-.
- Methylmorphimethine methohydroxide, decomposition of (VONGERICHTEN), A., i, 264.
- Methylnarcotamide, physiological action of (FALK), A., ii, 201.
- Methylnarcotimide, physiological action of (FALK), A., ii, 201.
- Methylnitramine, reduction of (THIELE and MEYER), A., i, 407.
- action of fused potash on (VAN ERP), A., i, 276.
- action of β -naphthol and aluminium on (THIELE and MEYER), A., i, 407.
- Methylnitrazimidobenzene, from nitrazimidobenzene, identity of, with derivative from nitraminomethylaniline (ZINCKE and HELMERT), A., i, 301.

- Methylnorisonarcotine, preparation and properties of, and salts (LIEBERMANN), A., i, 711.
- Methylnoropiananilidic acid and its sodium salt (LIEBERMANN), A., i, 683.
- Methylnoropianic acid (LIEBERMANN), A., i, 682.
 action of, on hydrocotarnine (LIEBERMANN), A., i, 711.
 tetrahydroquinoline derivative of, and its sodium salt (LIEBERMANN), A., i, 683.
- Methylnoropian- α -naphthalidic acid (LIEBERMANN), A., i, 683.
- Methylnoropian- β -naphthalidic acid and its sodium salt (LIEBERMANN), A., i, 682.
- Methylnoropian-*p*-toluidic acid (LIEBERMANN), A., i, 683.
- Methyloctylnitramine (FRANCHIMONT and VAN ERP), A., i, 298.
- 5-Methylisozolone, oxime of (JOVITSCHITSCH), A., i, 83.
 4-nitro- (JOVITSCHITSCH), A., i, 82.
 4-oximido- (JOVITSCHITSCH), A., i, 81.
- μ -Methyl- β -oxythiazole- α -carboxylic acid, the ureide, ammonium, sodium, barium, and silver salts of (WEIDEL and NIEMIŁOWSKI), A., i, 106.
- Methylparaconic acid, products of distillation of (SPeyer), A., i, 128.
- Methylpellotine, preparation of (HEFFTER), A., i, 267.
- β -Methylcyclopentanone (*β -methylketopentamethylene*), condensation of, with benzaldehyde and acetone (WALLACH), A., i, 573.
- 3-Methylcyclopentane-1-carboxylic acid (*3-methylpentamethylene-1-carboxylic acid*): its calcium and silver salt (EULER), A., i, 145.
- 3-Methylcyclopentane-1:1-dicarboxylic acid (*3-methylpentamethylene-1:1-dicarboxylic acid*) (EULER), A., i, 145.
- μ -Methylpenthiazoline, γ -bromo-, and its picrate (DIXON), T., 853; P., 1896, 100.
 action of silver nitrate on (DIXON), T., 853.
 hydrobromide (DIXON), T., 852; P., 1896, 100.
 action of caustic potash on (DIXON), T., 853; P., 1896, 100.
 action of silver chloride on (DIXON), T., 853.
 hydrochloride (DIXON), T., 853.
- 4-Methylpenthiazoline 2-ethosulphide (LICHMANN), A., i, 545.
 2-hydrosulphide and its salts (LICHMANN), A., i, 545.
- μ -Methylphenanthridine: its hydrochloride, mercuriochloride, picrate, methiodide, platinochloride, aurochloride, and dichromate (PICTET and HERBERT), A., i, 52, 483.
- Methylphenofluorindine and its dihydrochloride (KEHRMANN and BÜRGIN), A., i, 513.
- α -Methylphthalic acid (1:3:4-methylbenzenedicarboxylic acid), from dimethylnaphthalene (COLLIE and WILLMORE), T., 239; P., 1896, 47.
- 1:2:4-Methylisophthalic acid and its methylic salt (BENTLEY and PERKIN), P., 1896, 79.
- β -Methylpicolinic acid and its hydrochloride and platinochloride (ZINCKE and WINZHEIMER), A., i, 500.
- α -Methylpimelic acid and its ethylic salt (ZELINSKY and GENEROSOFF), A., i, 350.
- n*-Methylpipercolinic acid, ethylic salt: its methiodide, aurochloride of the methiodide (WILLSTÄTTER), A., i, 319.
- Methylpiperidinecarboxylic acid and granatic acid, identity of (CIAMICIAN and SILBER), A., i, 397.
- Methylisopropylacetic acid. See Hexoic acids: Trimethylpropionic acid.
- $\alpha\alpha_1$ -Methylisopropyladipic acid (BENTLEY, HAWORTH, and PERKIN), T., 161.
- Methylpropylamine and its salts (STOERMER and VON LEPEL), A., i, 663.
 methylpropyldithiocarbamate (STOERMER and VON LEPEL), A., i, 662.
 nitroso- (STOERMER and VON LEPEL), A., i, 662.
- Methylpropylaminoacetone (STOERMER and POGGE), A., i, 408.
- Methylpropylaniline, nitroso-, hydrochloride of, action of soda on (STOERMER and VON LEPEL), A., i, 663.
- Methylpropylbenzaldehyde (BOUVEAULT), A., i, 649.
 hydrazone (BOUVEAULT), A., i, 649.
- Methylpropylbenzenes. See Cymenes.
- Methylisopropylbenzenes. See Cymenes.
- p*-Methylisopropylbenzoylpropionic acid (MUHR), A., i, 232.
- Methylisopropylcyclobutanedicarboxylic acid (BENTLEY, HAWORTH, and PERKIN), T., 161.
 ethylic salt, T., 162.
- Methylisopropylbutanetricarboxylic acid, ethylic salt (BENTLEY, HAWORTH, and PERKIN), T., 162.
- Methylpropylearbanide (STOERMER and VON LEPEL), A., i, 663.

- Methylpropyldinitromethane. See Pentane, $\beta\beta$ -dinitro-.
- Methylisopropyldinitromethane. See *iso*-Pentane, $\beta\beta$ -dinitro-.
- Methylisopropylethanetricarboxylic acid, ethylic salt, hydrolysis of (BENTLEY, PERKIN, and THORPE), T., 274; P., 1896, 64.
- 1 : 3-Methylisopropylcyclohexadiene (KNOEVENAGEL), A., i, 288.
- 5-chloro- (GUNDLICH and KNOEVENAGEL), A., i, 212.
- 1 : 4-Methylisopropylcyclohexadiene (*dihydrocymene*), chloro- (JÜNGER and KLAGES), A., i, 245.
- 1 : 4-Methylpropylcyclohexane (*hexahydrocymene*), dichloro-, from menthone (JÜNGER and KLAGES), A., i, 244.
- Methyl-3-*isopropylcyclohexanone*, action of phosphorus pentachloride on (GUNDLICH and KNOEVENAGEL), A., i, 212.
- : 4-Methylpropylcyclohexene (*tetrahydrocymene*), chloro- (JÜNGER and KLAGES), A., i, 245.
- : 3-Methylisopropylcyclohexenol-5 and its acetyl derivative, methyl ether chloride and bromide (KNOEVENAGEL), A., i, 287.
- : 5-Methylisopropyl- Δ_2 -cyclohexenone (*methylisopropylketotetrahydrobenzene*) (KNOEVENAGEL), A., i, 210.
- : 5-Methylisopropylcyclohexenone-4-carboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 120.
- : 5-Methyl-5-*isopropyl*- Δ_2 -cyclohexenone-6-carboxylic acid (KNOEVENAGEL), A., i, 210.
- ethylic salt of (KNOEVENAGEL), A., i, 120.
- is*-Methylisopropylsuccinic acid, silver salt, anil and anilic acid of (BENTLEY, PERKIN, and THORPE), T., 279, 282; P., 1896, 64.
- trans*-Methylisopropylsuccinic acid and its silver salt, anil and anilic acid (BENTLEY, PERKIN, and THORPE), T., 278, 283; P., 1896, 65.
- Iethylisopropylsuccinic anhydride, *cis*- and *trans*- forms of (BENTLEY, PERKIN, and THORPE), T., 278; P., 1896, 65.
- Iethylisopropyltetramethylenedicarboxylic acid. See Methylisopropylcyclobutanedicarboxylic acid.
- Iethylprotocotoin, crystallography of (NEGRI), A., i, 655.
- Iethylpurin, β -*trichloro*- (FISCHER), A., i, 13.
- Iethylpurpuroxanthin from *m*-dihydroxybenzoic and *o*-toluic acids, diacetyl derivative of (SCHUNCK and MARCHLEWSKI), T., 70; P., 1895, 202.
- Methylpurpuroxanthins from *m*-dihydroxybenzoic and *m*-toluic acids (SCHUNCK and MARCHLEWSKI), T., 69; P., 1895, 202.
- 3-Methylpyrazoloneisobutyric acid (THIELE and HEUSER), A., i, 341.
- 3-Methylpyrazolonepropionic acid (TRAUBE and LONGINESCU), A., i, 310.
- 3-Methylpyridine-2-carboxylic acid. See β -Methylpicolinic acid.
- Methylpyrrolidine, relation of, to cuskhygrine (LIEBERMANN and CYBULSKI), A., i, 710.
- 1'-Methylquinoline, 4-nitro- (CLAUS and SETZER), A., i, 498.
- 2'-Methylquinoline (*quinaldine*) from condensation product of 1 : 3 : 4-xyldine and acetaldehyde (MILLER and PLÖCHL), A., i, 535.
- condensation of, with phthalaldehydic acid (NENCKI), A., i, 256.
- 2' : 4'-Methylquinolinecarboxylic acid (*aniluritic acid*) (SIMON), A., i, 86.
- Methylsalicylaldehyde. See *o*-Methoxybenzaldehyde.
- Methylsalicylanilide. See *o*-Methoxybenzanilide.
- Methylsalicylic acid. See *o*-Methoxybenzoic acid.
- Methylsalicylic alcohol. See *o*-Methoxybenzylic alcohol.
- Methylsaligenylcamphor (MINGUIN), A., i, 694.
- d*-Methylsantonous acid and its ethylic salt (ANDREOCCI), A., i, 183.
- l*-Methylsantonous acid (ANDREOCCI), A., i, 184.
- Methylsantonous acid, racemic, and its methylic and ethylic salts (ANDREOCCI), A., i, 184.
- Methylscopoline (LUBOLDT), A., i, 515.
- Methylscopolinemethylammonium iodide and its salts (LUBOLDT), A., i, 515.
- Methylsuccinimide. See Pyrotartarimide.
- p*-Methylsulphonefluorescein : its tetrachloro- and dibromo- derivatives (JONES), A., i, 50.
- Methyltaurocarbanic acid, β -chlorobromo- (GADAMER), A., i, 415.
- Methylterephthalic acid, methylic salt of (BENTLEY and PERKIN), P., 1896, 79.
- β -Methyltetramethylene dibromide, condensation of, with ethylic sodiomalonate (EULER), A., i, 145.

- β -Methyltetramethylenediamine and its dihydrochloride (EULER), A., i, 145.
- β -Methyltetramethyleneglycol (EULER), A., i, 145.
- d*-Methyltetronic acid. See Tetric acid.
- Methyltetrose (FISCHER), A., i, 526.
- acetamide compound of (FISCHER), A., i, 526.
- action of nitric acid on (FISCHER), A., i, 525, 526.
- μ -Methylthiazole, β -amino-, hydrochloride of (WEIDEL and NIEMILOWICZ), A., i, 106.
- μ -Methylthiazole- α -carboxylamide, β -amino- (WEIDEL and NIEMILOWICZ), A., i, 106.
- μ -Methylthiazole- α -carboxylic acid, β -amino- (WEIDEL and NIEMILOWICZ), A., i, 106.
- Methylthiazolecarboxylic acid, μ -amino-, ethylic salt (CONRAD and SCHMIDT), A., i, 409.
- Methylthienyltriphenylmethane (WEISSE), A., i, 565.
- Methylthiocarbimide, action of bromethylamine on (DIXON), T., 23.
- Methylthiouramil (FISCHER), A., i, 141.
- action of mineral acids on (FISCHER), A., i, 142.
- methyl derivative (FISCHER), A., i, 142.
- β -Methylthio- ψ -uric acid (FISCHER), A., i, 142.
- Methyl-*p*-toluidine, *o*-nitro-, and its acetyl derivative (PINNOW), A., i, 161.
- Methyltridecylacetylene. See under Hexadecylene.
- Methyltriethylammonium chloride and hydroxide, action of heat on (HOFMANN LECTURE), T., 670.
- Methyltriethylphosphonium chloride, chloro- (HOFMANN LECTURE), T., 680.
- hydroxide (HOFMANN LECTURE), T., 680.
- preparation of (HOFMANN LECTURE), T., 675.
- iodide, discovery of (HOFMANN LECTURE), T., 602.
- Methyltriphenodioxazine (KEHRMANN and BÜRGIN), A., i, 707.
- i*-Methyltropinic acid and its methiodide and other derivatives (WILLSTÄTTER), A., i, 265.
- d*-Methyltropinic acid: its methiodide and other derivatives (WILLSTÄTTER), A., i, 265, 267.
- propylic salt (WILLSTÄTTER), A., i, 267.
- n*-Methyltroponine: its salts and methiodide (CIAMICIAN and SILBER), A., i, 397.
- n*-Methyltroponinoxime (CIAMICIAN and SILBER), A., i, 397.
- γ -Methyluric acid (FISCHER), A., i, 14.
- Methylisovaleric acid. See Hexoic acid: Trimethylpropionic acid.
- tri*-Methylvanillin, α -trithio- (WÖRNER), A., i, 226.
- β -trithio- (WÖRNER), A., i, 226.
- Methylxanthine, formation and action of, in the body (ALBANESE), A., ii, 319.
- Meyer, Lothar, memorial lecture (BEDSON), T., 1403; P., 1896, 119.
- Mezealine, properties of (HEFFTER), A., i, 267.
- Mica. See Biotite, Muscovite, &c.
- Micas, lithia, constitution of (CLARKE), A., ii, 37.
- Mica-syenite from Saxony (HENDERSON), A., ii, 533.
- Microbes, aërobic, effect of different organic compounds in nutrition of (LOEW), A., ii, 55.
- source of carbon for nitrifying (GODLEWSKI), A., ii, 669.
- Microcline (FOUQUÉ), A., ii, 533.
- from Greenland (USSING), A., ii, 372.
- from Maryland (HILLEBRAND), A., ii, 40.
- Microcline-micropertthite from Greenland (USSING), A., ii, 372.
- Microlite from Maine (FOOTE), A., ii, 660.
- Micro-organisms, fermentation of uric acid by (GÉRARD), A., ii, 668.
- Microscope, polarising, for butter analysis (BESANA), A., ii, 129.
- Mitosis, chemistry of (HEINE), A., ii, 489.
- Milk, composition of, in different animals (PIZZI), A., ii, 120.
- composition of fats from, in different animals (SOLBERG), A., ii, 378.
- freezing point of, as a test of purity (WINTER), A., ii, 149.
- curdling of (EDMUNDS), A., ii, 489.
- effect of borax on the curdling of (ALLEN), A., ii, 489.
- action of sodium, potassium, ammonium, and calcium salts on the curdling of (RINGER), A., ii, 49.
- action of pancreatic juice on (HALLIBURTON and BRODIE), A., ii, 662.
- sterilisation of (CAZENEUVE), A., ii, 120.
- Milk, cows', composition of (RÖHMANN), A., i, 515.
- Milk, human, analyses of (SÖLDNER and CAMERER), A., ii, 378.

- Milk, condensed, composition of (PEARMAIN and MOOR), A., ii, 343.
analysis of (PEARMAIN and MOOR), A., ii, 343.
- Milk, pasteurised, estimation of fat in, by creamometers (CAZENEUVE and HADDON), A., ii, 130.
- Milk, estimation of added water in, by taking the freezing point (HAMBURGER), A., ii, 550.
estimation of albumin in (VAN SLYKE), A., ii, 132.
estimation of boric acid in, volumetrically (JÖRGENSEN), A., ii, 449.
estimation of chlorides in (DENIGÈS), A., ii, 386.
estimation of fat in (WELLER; LONGI), A., ii, 228.
estimation of lactose in (RAUMER and SPAETH), A., ii, 394; (WILEY and EWELL), A., ii, 628.
- Milk production, effects on, of feeding with whale and herring meal (SEBEBLIEN), A., ii, 197.
- Milk-serum, specific gravity of (RAUMER and SPAETH), A., ii, 394.
- Milk-sugar. See Lactose.
- Mineral oil (*paraffin*), detection of, in olive oil (CARPENTIER), A., ii, 452.
(*petroleum*), American, composition and properties of (WANKLYN and COOPER), A., i, 1.
- Ohio and Canadian sulphur, composition and properties of (MABERY), A., i, 269, 270.
- Berea grit, analyses of (MABERY and DUNN), A., i, 329.
- Russian, composition and properties of (WANKLYN and COOPER), A., i, 1, 2.
estimation of (KISSLING), A., ii, 452.
separation, &c., of (HENRIQUES), A., ii, 77.
separation of light, from benzene (HENRIQUES), A., ii, 77.
detection of vegetable or animal oil in (HALPHEN), A., ii, 399.
analyses of (ENGLER and JEZIORANSKI), A., i, 1.
estimation of rosin oil in (KLIMONT), A., ii, 224.
- Mineral water. See Water.
- Minerals, classification of, according to the periodic system (SCHULZE), A., ii, 566.
crystalline form of chemically simple (RINNE), A., ii, 29.
"dilute coloration" of (WEINSCHEK), A., ii, 654.
of high specific gravity, separation of (PENFIELD), A., ii, 216.
- Minerals, apparatus for separation of (LASPEYRES and KAISER), A., ii, 660.
- Minerals, ores, &c., from Austria, analyses of (JOHN and EICHLEITER), A., ii, 252.
- Minervite from Dépt. Hérault (CARNOT), A., ii, 529.
- Modern theories of chemistry, the L. Meyer (BEDSON), T., 1427; P., 1896, 119.
- Moldavite from Bohemia (HANAMANN), A., ii, 434.
- Molecular volume. See Volume, molecular.
- Molecular weight or weights of optically active and inactive isomerides (TRAUBE), A., i, 526.
determination of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 236.
determination of, of inorganic compounds (BILTZ), A., ii, 412.
ebullioscopic method for determination of (BECKMANN and SCHLIEBS), A., i, 124.
determination of, by the diminution of solubility method (TOLLOCZKO), A., ii, 637.
determination of, by means of molecular solution volumes (TRAUBE), A., ii, 153, 411.
of hydrocarbons, determination of, by means of molecular volume (TRAUBE), A., ii, 153.
of solid potassium dihydrogenarsenate (FOCK), A., ii, 160.
of solid potassium perchlorate (FOCK), A., ii, 160.
of solid potassium permanganate (FOCK), A., ii, 160.
of solid rubidium permanganate (FOCK), A., ii, 160.
of solid potassium dihydrogen phosphate (FOCK), A., ii, 160.
- See also Density, vapour; Heat, boiling point, elevation of; Heat, freezing point, depression of.
- Molybdenite from New South Wales (LIVERSIDGE), A., ii, 658.
- Molybdenum, preparation of pure (VANDENBERGHE), A., ii, 427.
preparation of, from molybdenite (GUICHARD), A., ii, 563.
action of carbonic anhydride on (VANDENBERGHE), A., ii, 428.
action of hydrogen on (VANDENBERGHE), A., ii, 428.
action of nitrogen on (VANDENBERGHE), A., ii, 428.
action of nitrogen, carbonic anhydride, carbonic oxide, hydrogen sulphide, and nitric oxide on (FÉRÉE), A., ii, 476.

- Molybdenum, action of sulphurous anhydride on (FÉRÉE), A., ii, 476.
- Molybdenum alloys with aluminium (MOISSAN), A., ii, 602.
- with iron (BENNEVILLE), A., ii, 174.
- Molybdenum amalgams (FÉRÉE), A., ii, 476.
- Molybdenum dihydroxychloride, molecular weight of (VANDENBERGHE), A., ii, 27.
- oxyfluoride (PICCINI), A., ii, 178.
- oxyfluorides, compounds of, with thallous fluoride (MAURO), A., ii, 248.
- potassium oxyfluorides (MARCHETTI), A., ii, 20.
- Molybdic acid, salts of, with rare earths (HITCHCOCK), A., ii, 526.
- as a microchemical reagent (HEINE), A., ii, 536.
- Bronzes (STAVENHAGEN and ENGELS), A., ii, 28.
- Iodomolybdic acid and its salts (CHRÉTIEN), A., ii, 651.
- Ammonium phosphomolybdate, composition of (BLAIR and WHITFIELD), A., ii, 503.
- Perthiomolybdic acid (HOFMANN), A., ii, 476.
- Molybdenum sulphides and oxides, compounds of ammonia and potassium cyanide with (VON DER HEIDE and HOFMANN), A., ii, 605.
- molybdtartaric acid, sodium salt of (HENDERSON and BARR), T., 1455; P., 1896, 169.
- Monazite from North Carolina (THORPE), A., ii, 34.
- gases from (TILDEN), A., ii, 655.
- Monazite sands, rare earths in (SCHÜTZENBERGER and BOUDOUARD), A., ii, 475.
- Monilia candida*, enzyme from (FISCHER and LINDNER), A., i, 195.
- Monomolecular reactions. See Reactions.
- Monotropa hypopithys*, the glucoside of, and the ferment which hydrolyses it (BOURQUELOT), A., ii, 540.
- Monticellite from Arkansas (PENFIELD and FORBES), A., ii, 373.
- Morin, the colouring matter of *Maclura tinctoria*, properties of (PERKIN and BABLICH), T., 792; P., 1896, 106.
- constitution of, in relation to quercetin, chrysin, and gentisein (PERKIN and BABLICH), T., 798; P., 1896, 106.
- action of fused alkali on (PERKIN and BABLICH), T., 793; P., 1896, 106.
- Morin hydriodide, analysis of (PERKIN), T., 1442; P., 1896, 167.
- dimethyl ether, preparation and properties of (PERKIN and BABLICH), T., 798; P., 1896, 106.
- tetramethyl ether, preparation, and acetyl derivative of (PERKIN and BABLICH), T., 796; P., 1896, 106.
- decomposition of, with alcoholic potash (PERKIN and BABLICH), T., 797; P., 1896, 106.
- Morin, tetrabromo-, preparation of, and the pentacetyl derivative of (PERKIN and BABLICH), T., 794; P., 1896, 106.
- non-formation of acid compounds of (PERKIN), T., 1443; P., 1896, 167.
- Morphine, constitution of (VONGERICHTEN), A., i, 264.
- and morphine hydrochloride, water of crystallisation of (GÖHLICH), A., i, 191.
- effect of, on the germination of seeds (MOSSO), A., ii, 326.
- detection of (BRUYLANTS), A., ii, 132; (KIPPENBERGER), A., ii, 681.
- detection of, by diazo-solutions (HEWLETT), A., ii, 284.
- estimation of, in opium (DOTT), A., ii, 283; (KEBLER), A., ii, 403.
- titration of, by iodine (KIPPENBERGER), A., ii, 682.
- Moulds, assimilation of nitrogen by (PRIEWITSCH), A., ii, 571.
- Mucic acid from phrenosin (THUDICHUM), A., i, 400.
- velocity of lactone formation of (HJELT), A., i, 597.
- action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
- Mucilage of capsicum seed (VON BITTÓ), A., ii, 209.
- Mucilages, composition of some (YOSHIMURA), A., ii, 60.
- Mucin (CHITTENDEN and GIES), A., i, 456.
- Mucor mucedo*, cholesterol from (GÉRARD), A., i, 21.
- Musa paradisiaca*, constituents of sap of (HÉBERT), A., ii, 494.
- Muscle buttons, composition of (HEFFTER), A., i, 267.
- Muscovite from Bavaria (SCHWAGER and GÜMBEL), A., ii, 432.
- from Servia (STANOJEVIĆ), A., ii, 255.
- chromiferous, from Ontario (HOFFMANN), A., ii, 191.

Muscovite, action of caustic soda on (FRIEDEL), A., ii, 482.
 See also Sericite; Damourite.
 Muscle, mineral constituents of (KATZ), A., ii, 377.
 source of carbonic anhydride of (KRÜGER), A., ii, 487.
 actions of chemically related substances on (BLUMENTHAL), A., ii, 377.
 function of glycogen in (SEEGER), A., ii, 487.
 proteids of (VON FÜRTH), A., ii, 48.
 presence of urea in (SCHÖNDORFF), A., ii, 318.
 estimation of glycogen in (KISTIAKOFFSKY), A., ii, 80.
 Muscular energy, sugar as a source of (STOKVIS, MOSSO, and HARLEY), A., ii, 44.
 Muscular work, sources of energy of (SCHENCK), A., ii, 48.
 influence of, on proteid metabolism (KRUMMACHER), A., ii, 377.
 excretion of creatinine during (ACKERMANN), A., ii, 121.
 Mustard, action of, on digestion (GOTTLIEB), A., ii, 42.
 Mustard. See also Agricultural chemistry (Appendix).
 Mustard oil, estimation of (FOERSTER), A., ii, 452.
 Mustard oils. See under the respective thiocarbimides.
 Musts, fermentation of (RIETSCH and HEISELIN), A., ii, 53.
Mylitta lapidescens, analysis of (WINTERSTEIN), A., ii, 63.
 Myogen. See Myosinogen.
 Myoproteid in fishes' muscle (VON FÜRTH), A., ii, 48.
 Myosin, formation of, in muscle plasma (VON FÜRTH), A., ii, 48.
 Myosinogen of muscle plasma (VON FÜRTH), A., ii, 48.
para-Myosinogen (VON FÜRTH), A., ii, 49.
Myrica nagi, yellow colouring matter of (PERKIN and HUMMEL), T., 1287; P., 1896, 145.
 dyeing properties of, and tannin in (PERKIN and HUMMEL), T., 1294; P., 1896, 145.
 Myricetin, the yellow colouring matter of *Myrica nagi* (PERKIN and HUMMEL), T., 1287; P., 1896, 145.
 identity of the colouring matter of sumach with (PERKIN and ALLEN), T., 1302; P., 1896, 157.
 preparation, and chemical and dyeing properties of (PERKIN and HUMMEL), T., 1287; P., 1896, 145.

Myricetin, constitution of, and its relation to quercetin (PERKIN and HUMMEL), T., 1293; P., 1896, 145.
 action of fused alkalis on (PERKIN and HUMMEL), T., 1292; P., 1896, 145.
 acetyl and benzoyl derivative of (PERKIN and HUMMEL), T., 1291; P., 1896, 145.
 Myricetin, *tetrabromo*-, preparation and properties of (PERKIN and HUMMEL), T., 1293; P., 1896, 145.
 Myristic acid from wool fat (DARMSTAEDTER and LIFSCHÜTZ), A., i, 346.
 behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.
 Myrosin, solubility of, in alcohol (DASTRE), A., i, 398.
 Myxœdema, action of thyroiodin in (ROOS), A., ii, 488.

N.

Nantokite from Broken Hill, N.S.W. (LIVERSIDGE), A., ii, 31.
 Naphthaflorescein (FRIEDLÄNDER and RÜDT), A., i, 569.
 Naphthalene, discovery of (HOFMANN LECTURE), T., 597.
 fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.
 magnetic rotatory power, &c., of (PERKIN), T., 1064, 1088, 1089, 1195, 1242.
 heat of solution of, in methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.
 cryoscopic behaviour of phenols dissolved in (AUWERS), A., ii, 156.
 freezing points of solutions of derivatives of phenol in (AUWERS and INNES), A., ii, 293.
 influence of pressure on the freezing point of a benzene solution of (COLSON), A., ii, 157.
 Naphthalene, bromo- β -iodo- (m. p. 55°) (HIRTZ), A., i, 532.
 1 : 2-bromiodo- (HIRTZ), A., i, 532.
 1 : 4-bromiodo- (HIRTZ), A., i, 532.
 1 : 2-dichloro-, from 2 : 1-chloro-naphthalenesulphonamide (ARMSTRONG and WYNNE), P., 1895, 238.
 1 : 3-dichloro- (ARMSTRONG and WYNNE), P., 1895, 240.
 1 : 2'-dichloro- (ARMSTRONG and WYNNE), P., 1895, 241.
 1 : 3 : 4'-trichloro- (ARMSTRONG and WYNNE), P., 1895, 241.

- Naphthalene, 1 : 2 : 1 : 4'-*tetrachloro*-, preparation of (BRUYN and VAN LEENT), A., i, 605.
pentachloro-, preparation of (BRUYN and VAN LEENT), A., i, 605.
 1 : 4'-*dicyano*- (MORO), A., i, 567.
 β -iodoxy-, preparation of (WILLGERODT), A., i, 533.
 α -nitro-, magnetic rotatory power, &c., of (PERKIN), T., 1096, 1181, 1239.
dinitro-, reduction of (HOFMANN LECTURE), T., 647.
 1 : 4'-*dinitro*- (GASSMANN), A., i, 566.
 1 : 1'-*dinitro*- (GASSMANN), A., i, 486, 566.
tetranitro-derivatives of, action of hydrochloric acid on (BRUYN and VAN LEENT), A., i, 604, 605.
 1 : 2 : 3-Naphthaleneazohydroxy-naphthoic acid (MÖHLAU and KRIEBEL), A., i, 242.
 1 : 4'-Naphthalenedicarboxylic acid, ammonium, calcium, silver, methylic, ethylic, phenylic salts and chloride (MORO), A., i, 567.
dinitro-, ammonium, calcium, methylic, ethylic salts (MORO), A., i, 568.
trinitro-, barium, ethylic salts (MORO), A., i, 568.
 1 : 2'-Naphthalenedisulphonic acid, chloride (ARMSTRONG and WYNNE), P., 1895, 240.
 3 : 1'-Naphthalenedisulphonic acid, 1 : 3'-*dichloro*- (FRIEDLÄNDER and KIELBASINSKI), A., i, 693.
 3 : 4'-Naphthalenedisulphonic acid, 1-chloro-, and its chloride (ARMSTRONG and WYNNE), P., 1895, 241.
 Naphthalene-red. See Azotrinaphthyl-diamine.
 1-Naphthalenesulphonic acid, nitration of the potassium salt (ARMSTRONG and WYNNE), P., 1895, 239.
 2-chloro-, barium, potassium, sodium salts, chloride, amide (ARMSTRONG and WYNNE), P., 1895, 238.
 3-Naphthalenesulphonic acid, 1-chloro- (ARMSTRONG and WYNNE), P., 1895, 240.
 sulphonation of potassium salt (ARMSTRONG and WYNNE), P., 1895, 241.
 Naphthalidine. See Naphthylamine.
 β -Naphthalidosymnaphthazine (FISCHER and ALBERT), A., i, 701.
 α -Naphthalidopyrotartaric acid, sodium salt (BOETTINGER), A., i, 443.
 α -Naphthalidopyruvic acid, oxidation of (GASSMANN), A., i, 488.
 β -Naphthalidopyruvic acid, calcium, barium salts (GASSMANN), A., i, 487.
 α -Naphthalidosuccinic acid, potassium salt (BOETTINGER), A., i, 443.
 β -Naphthalidosuccinic acid, sodium, calcium, barium salts (GASSMANN), A., i, 487.
 β -Naphthaquinone, condensation of, with *$\beta\beta$ -naphthylendiamine* (FISCHER and ALBERT), A., i, 701.
 1 : 2 : 3-Naphthaquinonecarboxylic acid, methylic salt (MÖHLAU and KRIEBEL), A., i, 243.
 1 : 2 : 3'-Naphthaquinonecarboxylic acid, 3 : 1'-*dibromo*- (ZINCKE), A., i, 308.
 β -Naphthaquinoneoxime, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
 4 : 1-Naphthaquinoneoxime, 2-amino- (KEHRMANN and HERTZ), A., i, 567.
 1 : 2-Naphthaquinone-4-sulphonic acid, condensation of, with phenyl-*o*-phenylenediamine (KEHRMANN and LOCHER), A., i, 700.
 Naphtharesorcinol. See 1 : 3-Dihydroxynaphthalene.
 Naphthasafranols, *α -* and *β -* (JAUBERT), A., i, 325.
 Naphthazarin, fluorescence of gases as (WIEDEMANN and SCHMIDT), A., ii, 86.
 Naphthazarin. See also Dihydroxy- *β -naphthaquinone*.
 $\alpha\beta\beta\beta$ -Naphthazine (FISCHER and ALBERT), A., i, 701.
sym-Naphthazine, *α -amino*- (FISCHER and ALBERT), A., i, 701.
 Naphthenecarboxylic acid, ethereal salt of (FUCHS and SCHIFF), A., i, 351.
 $\alpha\beta$ -Naphthobenzaldehydine (HINSBERG and KOLLER), A., i, 537.
 α -Naphthoic acid, magnetic rotatory power, &c., of the ethylic salt of (PERKIN), T., 1137, 1161, 1179, 1234, 1238.
 β -Naphthoic acid, magnetic rotatory power, &c., of the ethylic salt of (PERKIN), T., 1137, 1161, 1179, 1232, 1238.
 3-Naphthoic acid, 2-amino-, constitution of (MÖHLAU), A., i, 243.
 methylic salt and acetyl derivative of (MÖHLAU), A., i, 243.
 Naphthoic aldehyde (ROUSSET), A., i, 652.
 α -Naphthol, compound of, with aluminium chloride (PERRIER), A., i, 354.
 condensation of, with piperidine (ABEL), A., i, 254.
 α -Naphthol, 2-amino- (PLANCHER), A., i, 359.

- α -Naphthol, 3-amino-, from 1:3-dihydroxynaphthalene (FRIEDLÄNDER and RÜDT), A., i, 569.
- 4-amino- (PLANCHER), A., i, 359.
- 2'-amino-, acetyl derivative (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 4-bromo-; its picrate and acetyl derivative (REVERDIN and KAUFFMANN), A., i, 175.
- 4-chloro-; its picrate and acetyl derivative (REVERDIN and KAUFFMANN), A., i, 175.
- dinitro-, discovery of (HOFMANN LECTURE), T., 621.
- β -Naphthol, compound of, with aluminium chloride (PERRIER), A., i, 354.
- behaviour of, towards iodoform (SCHUYTEN), A., i, 442.
- condensation of, with piperidine (ABEL), A., i, 254.
- β -Naphthol, 1-amino- (PLANCHER), A., i, 359.
- 1'-amino-, acetyl derivative of (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 1:4-diamino-, dihydrochloride, diacetyl derivative (KEHRMANN and HERTZ), A., i, 566.
- Naphthols, effect of, on the freezing point of dilute soda solution (GOLD-SCHMIDT and GIRARD), A., i, 474.
- behaviour of, with nascent bromine (VAUBEL), A., ii, 507.
- ethereal salts of, extraction and detection of (DRAGENDORFF), A., ii, 278.
- Naphtholsulphonic acids. See Hydroxynaphthalenesulphonic acids.
- β -Naphtho- α -methyleinchonic acid (WEGSCHEIDER), A., i, 480.
- Naphthonitrile, preparation of (HOFMANN LECTURE), T., 705.
- α - and β -Naphthonitriles, magnetic rotatory powers, &c., of (PERKIN), T., 1097, 1137, 1206, 1244.
- Naphthothioamide, preparation of (HOFMANN LECTURE), T., 705.
- α -Naphthoylbenzoic acid, oxime anhydride, amide (GRAEBE), A., i, 443.
- α -Naphthyl ethyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1134, 1160, 1189, 1231, 1241.
- β -Naphthyl ethyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1134, 1160, 1190, 1231, 1241.
- Naphthyl isocyanate, preparation of (HOFMANN LECTURE), T., 715.
- α -Naphthyl mercaptan (*thio- α -naphthol*) (VOSWINKEL), A., i, 378.
- β -Naphthyl-*o*-acetamidobenzylacetamide (BUSCH and BRAND), A., i, 161.
- α -Naphthylallylsulphone (TROEGER and ARTMANN), A., i, 570.
- β -Naphthylallylsulphone, dibromide, glycol anhydride (TROEGER and ARTMANN), A., i, 569.
- α -Naphthylamine, composition of (HOFMANN LECTURE), T., 603; P., 1893, 138.
- magnetic rotatory power, &c., of (PERKIN), T., 1064, 1107, 1134, 1155, 1160, 1211, 1245.
- action of cyanogen chloride on (HOFMANN LECTURE), T., 601.
- amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- β -Naphthylamine, magnetic rotatory power, &c., of (PERKIN), T., 1107, 1134, 1155, 1160, 1212, 1233, 1245.
- diethylacetate (GASSMANN), A., i, 488.
- hydrogen succinate, hydrogen tartrate, dihydrogen citrate (GASSMANN), A., i, 487.
- Naphthylamines, behaviour of, with nascent bromine (VAUBEL), A., ii, 507.
- 2:1:4'-Naphthylaminedisulphonic acid (ARMSTRONG and WYNNE), P., 1895, 238.
- 4':1:2'-Naphthylaminedisulphonic acid, hydrogen potassium salt (ARMSTRONG and WYNNE), P., 1895, 240.
- 1:3-Naphthylaminesulphonic acid (*γ -naphthylaminesulphonic acid*) (ARMSTRONG and WYNNE), P., 1895, 239.
- sulphonation of (ARMSTRONG and WYNNE), P., 1895, 240.
- 2:1-Naphthylaminesulphonic acid, sodium salt (ARMSTRONG and WYNNE), P., 1895, 238.
- β -Naphthylaminobenzylmethylimidine, picrate and crystalline form of (VON PECHMANN), A., i, 31.
- α -Naphthyl-*o*-aminobenzylamine and its salts (BUSCH and BRAND), A., i, 160.
- β -Naphthyl-*o*-aminobenzylamine (BUSCH and BRAND), A., i, 161.
- β -Naphthyl-*o*-aminobenzylhydrazine (BUSCH and BRAND), A., i, 161.
- $\mu\alpha$ -Naphthylaminopenthiiazoline, γ -bromo-, and its picrate (DIXON), T., 29; P., 1895, 217.
- $\mu\beta$ -Naphthylaminopenthiiazoline, γ -bromo- (DIXON), T., 28; P., 1895, 217.
- β -Naphthylazocarboxylamide (THIELE), A., i, 94.
- α -Naphthylbenzylidene-*o*-aminobenzylamine (BUSCH and BRAND), A., i, 160.
- β -Naphthylbenzylidene-*o*-aminobenzylamine (BUSCH and BRAND), A., i, 161.

- β -Naphthylbromopropylsulphone (TROEGER and ARTMANN), A., i, 569.
- ab*- α -Naphthylcarboxyethylthiocarbamide (DORAN), T., 328; P., 1896, 74.
- ab*- β -Naphthylcarboxyethylthiocarbamide (DORAN), T., 329; P., 1896, 74.
- α -Naphthyldimethylamine, magnetic rotatory power, &c., of (PERKIN), T., 1108, 1138, 1156, 1213, 1233, 1245.
- β -Naphthyldimethylamine, magnetic rotatory power, &c., of (PERKIN), T., 1108, 1138, 1156, 1212, 1234, 1245.
- α -Naphthyldipropylamine, hydrochloride, hydriodide, and platinechloride (COHN), A., i, 100.
- 1 : 2-Naphthylenediamine, benzylidene derivative of (HINSBERG and KOLLER), A., i, 537.
- 1 : 3-Naphthylenediamine, from 1 : 3-dihydroxynaphthalene (FRIEDLÄNDER and RÜDT), A., i, 569.
- 1 : 4-Naphthylenediamine, preparation of (HOFMANN LECTURE), T., 647.
- 2 : 3-Naphthylenediamine, condensation of, with β -naphthaquinone (FISCHER and ALBERT), A., i, 701.
- 1 : 2'-Naphthylenediamine, from 1 : 2' : 2-dihydroxynaphthoic acid (FRIEDLÄNDER and ZINBERG), A., i, 244.
- 1 : 3'-Naphthylenediamine-3 : 1'-disulphonic acid (FRIEDLÄNDER and KIELBASINSKI), A., i, 69.
- 1 : 3'-Naphthylenediamine-4 : 1'-disulphonic acid (FRIEDLÄNDER and KIELBASINSKI), A., i, 693.
- 1 : 2-Naphthylenediamine-4-sulphonic acid (FRIEDLÄNDER and KIELBASINSKI), A., i, 693.
- 1 : 3'-Naphthylenediamine-4-sulphonic acid (FRIEDLÄNDER and KIELBASINSKI), A., i, 693.
- 1 : 4'-Naphthylenediamine-2-sulphonic acid (FRIEDLÄNDER and KIELBASINSKI), A., i, 693.
- α -Naphthylglyoxylic acid, ethylic salt, oxime, nitrile, pierate (ROUSSET), A., i, 652.
- β -Naphthylglyoxylic acid, ethylic salt (ROUSSET), A., i, 652.
- α -Naphthylhydroxybenzylidene-*o*-aminobenzylamine (BUSCH and BRAND), A., i, 160.
- β -Naphthyl-*o*-hydroxybenzylidene-*o*-aminobenzylamine (BUSCH and BRAND), A., i, 161.
- β -Naphthylhydroxypropylsulphone (TROEGER and ARTMANN), A., i, 569.
- α -Naphthylic carbonate, dichloride (REVERDIN and KAUFFMANN), A., i, 175.
- 1-bromo- (REVERDIN and KAUFFMANN), A., i, 176.
- 4-bromo- (REVERDIN and KAUFFMANN), A., i, 175.
- 4-chloro- (REVERDIN and KAUFFMANN), A., i, 175.
- 1-iodo- (REVERDIN and KAUFFMANN), A., i, 176.
- 4-nitro- (REVERDIN and KAUFFMANN), A., i, 175.
- mesitylic sulphide (BOURGEOIS), A., i, 18.
- phosphate, sulphonic acid of (REVERDIN and KAUFFMANN), A., i, 175.
- m*-xylylic sulphide (BOURGEOIS), A., i, 18.
- o*-xylylic sulphide (BOURGEOIS), A., i, 18.
- p*-xylylic sulphide (BOURGEOIS), A., i, 18.
- β -Naphthylic compounds, detection of (DRAGENDORFF), A., ii, 279.
- benzoylmethylic ether (FRITZ), A., i, 152.
- benzoylmethylic ether, oxime (FRITZ), A., i, 152.
- mesitylic sulphide (BOURGEOIS), A., i, 18.
- m*-xylylic sulphide (BOURGEOIS), A., i, 18.
- o*-xylylic sulphide (BOURGEOIS), A., i, 18.
- p*-xylylic sulphide (BOURGEOIS), A., i, 18.
- β -Naphthyl iodopropylsulphone (TROEGER and ARTMANN), A., i, 570.
- β -Naphthylmethylaminobenzenylmethylimidine, and its pierate (VON PECHMANN), A., i, 31.
- 3'- α -Naphthyl-1'-methylthiotetrahydroquinazoline, and its hydriodide (BUSCH and BRAND), A., i, 161.
- 3'- β -Naphthyl-1'-methylthiotetrahydroquinazoline, and its hydriodide (BUSCH and BRAND), A., i, 161.
- β -Naphthyl-*o*-nitrobenzyl nitrosamine (BUSCH and BRAND), A., i, 161.
- β -Naphthyl-*o*-nitrobenzylamine and its hydrochloride (BUSCH and BRAND), A., i, 161.
- β -Naphthylpianamide (WEGSCHEIDER), A., i, 480.
- Naphthylphenylcarbazole, pierate, and nitroso-, acetyl and benzoyl derivatives (SCHÖPFF), A., i, 244.
- Naphthylphenylcarbazolecarboxylic acid, ethylic, sodium, barium, magnesium, and calcium salts, acetyl derivative (SCHÖPFF), A., i, 243.

- β*-Naphthylphenylpropylenedisulphone (TROEGER and ARTMANN), A., i, 570.
- α*-Naphthylphthalimide, from the oxime anhydride of *α*-naphthoylbenzoic acid (GRAEBE), A., i, 443.
- β*-Naphthyl-2-pipecoline and its platinochloride, picrate, hydrochloride, and aurochloride (ROTH), A., i, 497.
- α*-Naphthylpiperidine and its hydrochloride, aurochloride, picrate, ferrocyanide, &c. (ABEL), A., i, 253.
- β*-Naphthylpiperidine and its hydrochloride, sulphate, aurochloride, and picrate (ROTH), A., i, 497.
- α*-Naphthylsulphamic acid and its ammonium salt (PAAL and JÄNICKE), A., i, 235.
- 3'-*α*-Naphthylthiotetrahydroquinazoline (BUSCH and BRAND), A., i, 160.
- 3'-*β*-Naphthylthiotetrahydroquinazoline (BUSCH and BRAND), A., i, 161.
- Narcotine, physiological action of derivatives of (FALE), A., ii, 201.
- behaviour of, in the Stas-Otto process (OTTO), A., ii, 508.
- detection of (FORMÁNEK), A., ii, 401.
- titration of, by iodine (KIPPENBERGER), A., ii, 682.
- iso*-Narcotine, formation of, and its salts (LIEBERMANN), A., i, 264.
- derivatives of (LIEBERMANN), A., i, 711.
- bromo-, preparation and properties of (LIEBERMANN), A., i, 711.
- nitro-, preparation and properties of (LIEBERMANN), A., i, 711.
- Natrolite from Dresden (ZSCHAU), A., ii, 189.
- from Moravia (EICHLEITER), A., ii, 482.
- Nelumbium nuciferum*, asparagine in (KINOSHITA), A., ii, 61.
- Neodymium tungstate and molybdate (HITCHCOCK), A., ii, 526.
- separation of thorium from (FRENSENIUS and HINTZ), A., ii, 677.
- Nepheline, formula of (RAMMELSBERG), A., ii, 189.
- from "Tibet" (BAUER), A., ii, 310.
- Nepheline-leucite-tephrite from Bohemia (HIBSCH), A., ii, 117.
- Nephelite-syenite of Greenland, minerals of (USSING), A., ii, 372.
- Nephelium lappaceum*, constituents of (BACZEWSKI), A., ii, 209.
- Nepodin and its diacetyl derivative (HESSE), A., i, 574.
- Nepolin and its diacetyl derivative (HESSE), A., i, 573.
- Nerve, action of gases and vapours on (WALLER), A., ii, 52.
- Nerve-cells, changes in, due to activity (EVE), A., ii, 663.
- Neurostearic acid (THUDICHUM), A., i, 400.
- Nickel, melting point of (HOLBORN and WIEN), A., ii, 87.
- possible octovalency of (CURTIUS), A., i, 338.
- Nickel-alloys with aluminium (MOISSAN), A., ii, 602; (COMBES), A., ii, 604.
- with copper, melting points of (GAUTIER), A., ii, 646.
- with tin (GAUTIER), A., ii, 602.
- Nickel salts, action of magnesium on solutions of (VITALI), A., ii, 420.
- boride (MOISSAN), A., ii, 424.
- carbonyl (CURTIUS), A., i, 338; (FREY), A., ii, 107.
- chloride, electrolytic dissociation of, at different temperatures (SALVADORI), A., ii, 512.
- hydrated, absorption of moisture by (HAKE), P., 1896, 34.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- niobate (LARSSON), A., ii, 564.
- phosphide (GRANGER), A., ii, 651.
- sesquiphosphide (GRANGER), A., ii, 602.
- cæsium sulphate, density and optical behaviour of (TUTTON), T., 415.
- potassium sulphate, density and optical behaviour of (TUTTON), T., 407.
- rubidium sulphate, density and optical behaviour of (TUTTON), T., 411.
- silicide (VIGOUROUX), A., ii, 176.
- sulphide, electrochemical preparation of (LORENZ), A., ii, 648.
- compound of, with carbon bisulphide and ammonia (WIEDE and HOFMANN), A., ii, 363.
- thiopyrophosphate (FERRAND), A., ii, 473.
- cyanide, thermochemical data of (VARET), A., ii, 513.
- heat of formation of double salts containing (VARET), A., ii, 513.
- compounds of, with cyanides of the alkalis and alkaline earths (VARET), A., i, 633.
- Nickel, detection of, microchemically (SCHRÖDER VAN DER KOLK), A., ii, 578.
- estimation of, electrolytically (NICHOLSON and AVERY), A., ii, 627.
- estimation of, in steel, &c. (BREARLEY), A., ii, 676.
- separation of, qualitatively from iron,

- chromium, cobalt, manganese, aluminium, and zinc (HARE), A., ii, 127.
- Nickel, separation of, from copper (BREARLEY), A., ii, 676.
separation electrolytically of, from gold and silver (SMITH and WALLACE), A., ii, 220.
separation of zinc from (JANNASCH), A., ii, 546.
- Nickel-iron sulphide from Sudbury, Canada (HILLEBRAND), A., ii, 40.
- Nicotine and its salts, rotatory dispersion of (GENNARI), A., ii, 286.
action of cyanogen on (HOFMANN LECTURE), T., 650.
effect of, on the germination of seeds (MOSSO), A., ii, 326.
estimation of, in tobacco (KISSLING), A., ii, 401; (VEDRÖDI), A., ii, 630.
- Niobite. See Columbite.
- Niobium containing carbon (LARSSON), A., ii, 564.
- Niobium oxychloride and pentachloride (DELAFONTAINE and LINEBARGER), A., ii, 653.
oxyfluoride (PICCINI), A., ii, 178.
potassium oxyfluoride (MARCHETTI), A., ii, 20.
Niobic acid, crystallised salts of (LARSSON), A., ii, 564.
- Niobium, reaction for (PENNINGTON), A., ii, 305.
separation of tantalum from (PENNINGTON), A., ii, 305.
- Nipecotinic acid (BESTHORN), A., i, 252.
- Nitrates. See Nitric acid under Nitrogen, also under Agricultural chemistry (Appendix).
- iso*-Nitramic acids, reduction of (TRAUBE and LONGINESCU), A., i, 340.
- Nitramide, mercury derivative of (THIELE and LACHMANN), A., i, 208.
- Nitramineacetic acid (HANTZSCH and METCALF), A., i, 521.
action of heat on (HANTZSCH and METCALF), A., i, 521.
ethylic salt (HANTZSCH and METCALF), A., i, 521.
- iso*-Nitramineacetic acid, sodium salt, reduction of (TRAUBE), A., i, 337.
- iso*-Nitraminepropionic acid, reduction of (TRAUBE and LONGINESCU), A., i, 340.
- Nitramines, action of fused potash on (VAN ERP), A., i, 275, 276.
- iso*-Nitraminic acids, action of dilute hydrochloric acid on (TRAUBE), A., i, 9.
- Nitric acid. }
Nitric oxide. } See under Nitrogen.
Nitric peroxide. }
- Nitrification. See under Agricultural chemistry (Appendix).
- Nitriles, action of sulphuric acid on (HOFMANN LECTURE), T., 696.
aromatic, action of sodium on (LOTTERMOSER), A., i, 298.
conversion of, into amides by hydrogen peroxide (DEINERT), A., i, 149.
- Nitriles. See also :—
Acetamidobenzonitrile.
Benzamidobenzonitrile.
Benzonitrile.
aa-Dimethyllevulinic acid nitrile.
Ethyltoluonitrile.
Hydroxymethylenebenzylidene cyanide, carbanilido-derivative of.
Malononitrile.
Mandelonitrile.
 α -Naphthonitrile and β -Naphthonitrile.
 α -Phenoxybutyronitrile.
Phthalonitrile.
Piperonylonitrile.
Pulegenonitrile.
Pyrotartaric nitrile.
o- and *p*-Tolunitriles.
Veratronitrile.
Xylidinonitrile.
- iso*-Nitriles, preparation of (HOFMANN LECTURE), T., 706.
- Nitrites. See Nitrous acid, under Nitrogen.
- Nitro-compounds, nature of (HOFMANN LECTURE), T., 646.
theory of the reduction of (MELDOLA), T., 13.
reduction of (BAMBERGER and KNECHT), A., i, 430.
electrolytic reduction of (NOYES and DORRANCE), A., i, 22.
behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.
poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.
- Nitro-derivatives. See :—
Acetamidocarbazole.
Acetamidocarvacrol.
Acetamidophenol.
Acetamidoquinoline.
Acetamidothymol.
Acetanilide.
Acetophenone.
Alizarin.
Aniline.
Anilinobenzoic acid.
Anilino-*m*-cymene.
Anilinetoluene.
Anisaldehyde.
o-Anisidine.
Anisoil.
Azimidobenzene.

Nitro-derivatives. See :—

Benzaldehyde.
 Benzaldehydephenylhydrazone.
 Benzaldoxime.
 Benzazoimide.
 Benzene.
 Benzeneazoacetamidophenol.
 Benzene-4-azo-2-aminophenol.
 Benzeneazoguaiacol.
 Benzene-2 : 1-diazoxide.
 Benzenediazonium.
 Benzethyleneamide.
 Benzethylimide.
 Benzhydrazide.
 Benzoic acid.
 Benzomethylamide.
 Benzoylazoimide.
p-Benzoylbenzoic acid.
p-Benzoyl-*p*-benzoylbenzoic acid.
 Benzoylsalicylic acid.
 Benzoyl-*o*-toluic and benzoyl-*m*-toluic acids.
 4-Benzylaniline.
 Benzylanisidine.
 Benzyl-*o*-benzoiesulphinide.
 Benzylic hydrosulphide.
 Benzylic methylic sulphide.
 Benzylideneaminobenzylaniline.
 Benzylideneaminophenylimido- β -butyric acid.
 Benzylideneaniline.
 Benzylidenediaminopentamethylene-tetramine.
 Benzylidenepherylhydrazone.
 Benzylmalonic acid.
 Benzylmethylnitramine.
 Benzyl-*o*-sulphamidobenzoic acid.
 Bidiphenylene-ethane.
iso-Butylic alcohol.
 Camphor.
 Campholenolide.
 Carbamide.
 Carbazole.
 Carbostyryl.
 Carboxyphenylmalonic acid.
 Carvacrol.
 Catechol.
 Cholesterylic chloride.
 Cresol.
 ψ -Cubebin.
m-Cymene.
 1 : 3 : 5-Cymidine.
 Decane (di-*iso*-amyl).
 Diazoamidobenzenes.
 Diazobenzene.
iso-Diazobenzene hydroxide.
 Diazobenzenebenzoylhydrazine.
 Diazobenzenehydroxyamidomethane.
 Diazobenzeneimide.
bis-Diazobenzene-pentamethylene-tetramine.
 Diazobenzenethiophenyl ether.

Nitro-derivatives. See :—

6 : 1-Diazoxy-2-anisole.
 Dibenzamido-*p*-xylene.
 Dibenzophenylethylenediamine.
 Dibenzylacetic acid.
 Dibenzylacetoacetic acid.
 Dibenzylbenzidine.
 Dibenzylethanoacetic acid.
 Dibenzylhydantoin.
 Dibenzylmalonic acid.
 Dihydroxybutane, tertiary.
 Dimethylaniline.
 Dimethylanilinesulphonic acid.
 Dimethylbarbituric acid.
 Dimethylmalonimide.
 Dimethylloxamide.
 Dimethyltoluidine.
 Diphenyl.
 Diphenylamine.
 Diphenylethylcarbamide.
 Diphenylguanidine.
 Diphenylmethane.
 Diphenylmethenylamidine.
 $\beta\mu$ -Diphenyloxazole.
 Diphenylsulphoxide.
 Diisopropylmethane.
 Dithienylphenylmethanes.
 Ethane.
 Ethoxyphenylhydrazine.
 Ethylcarbamide.
 Ethylmesitylene.
 Fluorenone.
 Glycerol.
 Guaiacol.
 Guanidine.
 Heptane.
 Hexane.
 Hydrazines.
 4-Hydroxybenzoic acid.
 Hydroxydiphenylamine.
 Hydroxypyridines.
 1-Hydroxyquinoline.
 Indole-2'-carboxylic acid.
 Indophenazine.
 Isatinsemicarbazone.
 Menthone.
 Mesidine.
 Mesitylene.
 Mesitylenic acid.
 Methane.
 Methaneazobenzene.
p-Methoxydiphenylamine.
 Methylaniline.
 Methylbenzylamine.
 Methylbenzylbenzamide.
m-Methylisobutylbenzene.
 Methyleneacetamidophenyl-
 amidine.
 Methylenephenylphenylamidine.
 Methyl- α -ethylpropylmethane.
m-Methylhexylbenzene.
 3-Methylindazole.

Nitro-derivatives. See :—

Methylisoazalone.
 1'-Methylquinoline.
 Methyltoluidine.
 Naphthalene.
 Naphthalenedicarboxylic acid.
 α -Naphthol.
 Naphthylbenzyl nitrosamine.
 α -Naphthyl carbonic acid.
iso-Narcotine.
 Nononaphthene.
 Octane.
 Opianic acid.
 Opianic acid β -naphthylamine.
 Opian- β -naphthylamic acid.
 Oreinol.
 Pentane.
 Phellandrene.
 Phenol.
 Phenolphthalein.
p-Phenoxybenzoic acid.
 Phenyl *p*-tolyl ketone.
 Phenyl *p*-tolyl ketoxime.
 Phenyl *p*-tolylphenylene diketone.
 Phenyl *o*-, *m*-, and *p*-xylyl ketones.
 Phenylacetic acid.
 Phenylazimidobenzene.
 Phenylbenzoic acid.
 Phenylbenzoylsemicarbazide.
 Phenylbenzyl nitrosamine.
 Phenyleinnamic acid.
 Phenyldiazosulphonic acid.
 Phenyleneaceticpropionic acid.
 Phenylethylmethane.
 Phenylhydrazine.
 Phenylhydrazinedisulphonic acid.
 Phenylic bisulphide.
 Phenylic ether.
 Phenylmalonic acid.
 bromo-.
 Phenylmethane.
 1 : 3-Phenylmethylpyrazolone-4-azobenzene.
 Phenyl naphthalene.
 Phenyl nitrosamine.
 Phenylpropionic acid.
 Phenylisopropylmethane.
 1 : 3-Phenylpyrazolone.
 Phenylpyridine.
 Phenylquinoline.
 Phenyltartronic acid.
 Phenyltetrahydroquinazoline.
 Phenyl-*p*-toluic acid.
 Phenyltolyl.
 Phenylurethane.
 Phthalic acid.
 Pieryldehydropiperidide.
 Piperonylacetone.
 Piperonylmethane.
 Piperonylpropylene.
 Propane.
 Propylmesitylene.

Nitro-derivatives. See :—

Quinoline.
 Resorcinol.
 Resorcinol diethyl ether.
 Tetramethyldiaminotriphenylmethane.
 Thiophen.
 Thymol.
 Thymotic acid.
 Toluene.
 Tolylmethylnitramine.
 Tolylmethylnitrosamine.
 Trihydroxybutane, tertiary.
 Trimethylindolinone.
 Trimethylindolium hydroxide.
 Triumaldehyde.
 Uramidobenzoic acid.
 Urethane.
 Urethaneacetic acid.
 Veratrole.
 Xylan.
 Xylene.
 Xylyleneexodiamine.
 Xylyleneexodiphthalimide.
 Xylidine.
 Nitrogen in firedamp (SCHLÆSING), A., ii, 655.
 ammoniacal, in minerals (ERDMANN), A., ii, 570.
 behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.
 a material for the absorption of (WARREN), A., ii, 646.
 combination of, with metals in presence of calcium carbide (ROSSEL), A., ii, 299.
 action of heated metals on (ASLANOGLOU), A., ii, 417.
 absorption of, by alkaline earth metals (MAQUENNE), A., ii, 299.
 absorption of, by barium (LIMB), A., ii, 299.
 absorption of, by magnesium (RAYLEIGH and RAMSAY), A., ii, 102.
 Nitrogen thiobromides (CLEVER and MUTHMANN), A., ii, 298.
 iodide, preparation and analysis of (CHATTAWAY), T., 1575; P., 1896, 173.
 constitution of (CHATTAWAY), T., 1572; P., 1896, 172.
 behaviour of, to reagents (CHATTAWAY), T., 1578; P., 1896, 73.
 combination of, with oxygen (RAYLEIGH and RAMSAY), A., ii, 101.
 Nitrous oxide and ethane, critical phenomena of mixtures of (KRENNEN), A., ii, 10.
 solubility of, in water and solutions of salts (GORDON), A., ii, 154.

Nitrogen :—

- Nitrous oxide, decomposition of, by shock (MAQUENNE), A., ii, 87.
 action of ammonia on, in presence of sodium (CURTIUS), A., i, 338.
 combination of, with carbonic oxide (DIXON), T., 780; P., 1896, 56.
 Hyponitrous acid (HANTZSCH), A., ii, 520.
 preparation of (TANATAR), A., ii, 417.
 formation of, by reduction of nitrosulphates (DIVERS and HAGA), T., 1613; P., 1896, 179.
 silver salt of, preparation of (PILOTY), A., i, 556.
 Nitric oxide, liquid and solid (DEWAR), P., 1895, 225.
 action of, on oxides and salts (AUDEN and FOWLER), A., ii, 172.
 compounds of, with ferrous chloride (THOMAS), A., ii, 26.
 spectroscopic examination of compounds of hæmoglobin with (GAMGEE), A., i, 713.
 Nitrous acid, depolarising action of, in a Grove's cell (IHLE), A., ii, 460, 554.
 action of, on glutin-peptone (PAAL), A., i, 455.
 action of, on proteids and salicylic acid (LANDSTEINER), A., i, 584.
 Nitrites, detection of (DENIGÈS), A., ii, 336.
 detection of, by cuprous salts (SABATIER), A., ii, 622.
 detection of, in presence of tartrates, nitrates, and chlorates (DENIGÈS), A., ii, 332.
 estimation of, in water (GILL and RICHARDSON), A., ii, 340.
 Nitric peroxide, solubility of, in antimony trichloride (THOMAS), A., ii, 609.
 action of, on bismuth chloride (THOMAS), A., ii, 429.
 Nitric acid, potential difference between platinum and (IHLE), A., ii, 460.
 formation of ammonia by electrolysis of (IHLE), A., ii, 464.
 action of, on silver (HIGLEY and DAVIS), A., ii, 560.
 Nitrates, mineral, genesis of (GAUTIER), A., ii, 185.
 in Griqualand West, origin of (MARLOTH), A., ii, 529.
 in potable waters (SCHLOESING), A., ii, 541.

Nitrogen :—

- Nitrates, detection of, in presence of tartrates, nitrites, and chlorates (DENIGÈS), A., ii, 332.
 See also under Agricultural Chemistry (Appendix).
 Nitrogen sulphide (CLEVER and MUTHMANN), A., ii, 298.
 acids containing sulphur and (WAGNER), A., ii, 599.
 compounds of, with sulphur and oxygen (CLEVER and MUTHMANN), A., ii, 298.
 Nitrogen organic compounds, stereochemistry of (MILLER and PLÖCHL), A., i, 534.
 pentethyl, attempts to prepare (LACHMANN), A., i, 460.
 assimilation and fixation of, by plants, &c. See under Agricultural Chemistry (Appendix).
 Nitrogen, estimation of, by the absolute method (DUNSTAN and CARR), P., 1896, 48.
 estimation of, volumetrically (DE KONINCK), A., ii, 77.
 estimation of, safety distillation tube for (HOPKINS), A., ii, 543.
 estimation of, in platinochlorides by Kjeldahl's method (VAN DAM), A., ii, 218.
 organic, estimation of, by the Kjeldahl process (CAUSSE), A., ii, 72.
 estimation of, in cheese (STUTZER), A., ii, 684.
 estimation of, in Peruvian guano (HEIBER), A., ii, 217.
 estimation of, in manures containing nitrates (SHERMAN), A., ii, 125.
 estimation of, in urine by the hypobromite process (ALLEN), P., 1896, 31.
 Nitrogenous matter, removal of, from malt and beer worts (EHRICH), A., ii, 540.
 Nitrogenous substances, action of polysulphides on (AUFSCHLÄGER), A., ii, 574.
 ψ-Nitroles, oxidation products of (BORN), A., i, 198.
 Nitroso-derivatives. See :—
 β-Anilidopropionic acid.
 Benzene.
 Benzoic acid.
 Carbamic acid.
 Carbamide.
 Dibenzylbenzidine.
 Dimethylaniline.
 Dimethylnaphthalenes.
 Diphenylamine.
 Diphenylsemicarbazide.
 Diisopropylmethane.

Nitroso-derivatives. See:—

- Ferrophénylmercaptide.
- Heptane.
- Hydroxynaphthoic acid.
- Methylamine.
- Methylisobutylamine.
- Methylpropylamine.
- Naphthylphenylcarbazoles.
- Nortropinone.
- Octane.
- Pentane.
- Phenylaminoacetylazoimide.
- Phenyleneethylenediamine.
- 3'-Phenylindazole.
- Pipecolinic acid.
- Propane.
- Pulegone.
- Scopoligenine.
- Stilbenedisulphonic acid.
- Tetric acid.
- Trimethylenephenylenediamine.
- Urethane.
- Urethaneacetic acid.
- Xylene.
- Nitroxysulphurous acid. See Sulphur—
dinitrososulphonic acid.
- Nodules of Leguminosæ, percentage of
nitrogen in (STOKLASA), A., ii, 205.
- Nomenclature of ring compounds
(RICHTER), A., i, 349.
- Nonoic acid. See Ennoic acid.
- Nononaphthene. See 1 : 2 : 5-Tri-
methylcyclohexane.
- Nonylamine. See Ennylamine.
- Nonylic alcohol. See Ennylic alcohol.
- Nopic acid, structure of (VON BAEYER
and VILLIGER), A., i, 623.
metallic salts of (VON BAEYER and
VILLIGER), A., i, 622.
sodium salt (VON BAEYER), A., i, 247.
- Nopinone: its oxime, and semicarba-
zone (VON BAEYER and VILLIGER),
A., i, 623.
- Norpic acid, silver salt (VON BAEYER).
A., i, 621.
aldehyde and semicarbazone from
(VON BAEYER), A., i, 620.
- Norsparteine, an impure form of
sparteine (HERZIG and MEYER), A.,
i, 68.
- Nortropinone and its derivatives (WILL-
STÄTTER), A., i, 582.
carbamate (WILLSTÄTTER), A., i, 582.
conversion of. into ψ -tropigenine
(WILLSTÄTTER), A., i, 655.
- Nortropinone, nitroso- (WILLSTÄTTER),
A., i, 582.
- Nortropinonoxime: its *n*-benzoyl de-
rivative (WILLSTÄTTER), A., i, 582.
- Northupite from California (FOOTE),
A., ii, 184.
artificial (SCHULTEN), A., ii, 610.

- Nucleic acid, decomposition of (KOSSEL
and NEUMANN), A., i, 658.
microchemical reactions of (HEINE).
A., ii, 489.
- Nuclein as a source of uric acid
(UMBER), A., ii, 666.
as a source of uric acid in the body
(WEINTRAUD), A., ii, 488.
as a source of the uric acid of urine
(CAMERER), A., ii, 379.
- Nut, Brazil, proteids of (OSBORNE and
CAMPBELL), A., i, 716.
hazel-, proteids of (OSBORNE and
CAMPBELL), A., ii, 716.
- Nut-oil, oxidisability of (BISHOP), A.,
ii, 399.
- Nutmeg, analysis of (BUSSE), A., ii, 82.
- Nutrition of plants, moulds, &c. See
Agricultural chemistry (Appendix).

O.

- Oats. See Agricultural chemistry
(Appendix).
- Oat-kernel, proteids of (OSBORNE and
CAMPBELL), A., i, 716.
- Oatmeal, proteids from (KJELDAHL),
A., i, 583.
- Obituary notices: S. W. M. Davy, T., 733.
Robert Galloway, T., 733.
George M. Roberts, T., 734.
Henry Davis Pochin, T., 735.
- Ochres, natural (GIN), A., ii, 479.
- Octane, normal, heat of evaporation of
(LUGININ), A., ii, 146.
 $\beta\beta$ -dinitro- (BORN), A., i, 199.
 β -nitro- β -nitroso- (BORN), A., i, 199.
- OCTENOIC ACID: Propylallylacetic acid
(HJELT), A., i, 598.
- OCTENYLIC ALCOHOL: *iso*-Butylallylcar-
binol, action of potassium hydrogen
sulphate on (FOURNIER), A., i, 457.
- OCTINENES:—
Methyl-6-heptandiene-1 : 3 (FOUR-
NIER), A., i, 457.
Methylamylacetylene, action of water
on (DESGREZ), A., i, 2.
- OCTINOIC ACID: Diallylacetic acid, am-
monium salt, action of heat on
(OBERREIT), A., i, 662.
ethylic salt, action of hydrogen brom-
ide on (OBERREIT), A., i, 666.
- OCTINOIC AMIDE: Diallylacetamide
(OBERREIT), A., i, 662.
- OCTINONITRILE: Diallylacetoneitrile and
its reduction (OBERREIT), A., i, 662.
- OCTINYLAMINE: Diallylethylamine: its
hydrochloride and platinochloride
(OBERREIT), A., i, 662.
hydrochloride, action of silver nitrite
on (OBERREIT), A., i, 662.

OCTINYLAMINE: Diallylethylamine nitrite and the action of heat on (OBERREIT), A., i, 662.

OCTINYLIC ALCOHOL: Diallylethylic alcohol (OBERREIT), A., i, 662.

OCTOIC ACIDS:—
 Octoic acid (*caprylic acid*), amino- (BEHREND), A., i, 410.
 α -Propylvaleric acid, methylic salt (OBERREIT), A., i, 666.
 Dipropylacetic acid, *di*-bromo- (OBERREIT), A., i, 666.

OCTOLACTONES: α -Propylvalerolactone (HJELT), A., i, 598; (OBERREIT), A., i, 666.
 bromo- (OBERREIT), A., i, 666.
iso-Propylvalerolactone (HJELT), A., i, 598.

OCTYLENEGLYCOL:—2:2:4-Trimethylpentane-1:3-diol, action of sulphuric acid on (FRANKE), A., i, 404.
 oxidation of (FRANKE), A., i, 404.

Octylic alcohol, action of light on (RICHARDSON and FORTEY), T., 1352; P., 1896, 164.
 bromide, chloride, and iodide, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1236, 1237.

Octylidene (*caprylidene*), action of water on (DESGREZ), A., i, 2.

Octyl- α -pseudonitrole. See Octane, β -nitro- β -nitroso-.

Octylquinoxalinedodecoic acid (SPIECKERMANN), A., i, 410.

Enanthaldehyde. See Heptoaldehyde.

Enanthoic acid (*ænanthylic acid*). See Heptoic acid.

Enanthylidene. See Heptylidene.

Enanthylidene compounds. See Heptylidene compounds.

Enothera Jaquinii, occurrence of galactan and araban in (YOSHIMURA), A., ii, 60.

Oil from capsicum seeds (VON BITTÓ), A., ii, 209.
 of *Cochlearia officinalis* (HOFMANN LECTURE), T., 718.
 cotton seed, existence of sulphur compound in (DUPONT), A., i, 409.
 action of silver nitrate on (DUPONT), A., i, 409.
 ethereal, from Sagapen (HOHENADEL), A., i, 58.
 from opoponax (BAUR), A., i, 57.

oils, effect of temperature on the refractive power of (BECKURTS and HEILER), A., ii, 81.
 critical temperatures of solutions of (CRISMER), A., ii, 506.
 a new constant for the identification of (CRISMER), A., ii, 506.

Oils, estimation of the oxidisability of (BISHOP), A., ii, 398.
 estimation of heat of bromination of (WILEY), A., ii, 549.
 chloro-iodine process, improvement on (WALLER), A., ii, 454.
 animal, detection of, in mineral oil (HALPHEN), A., ii, 399.
 ethereal, analysis of (HIRSCHSOHN), A., ii, 223.
 fatty, action of sulphur on (ALTSCHUL), A., i, 126.
 sulphur compounds of, hydrolysis of (ALTSCHUL), A., i, 126, 127.
 detection of, in copaiba balsam (HIRSCHSOHN), A., ii, 508.
 fish, analysis of (VEDRÖDI), A., ii, 81.
 mineral. See Mineral oils.

Secale cornutum, fatty, analysis of (MJÖEN), A., ii, 506.

vegetable, detection of, in mineral oil (HALPHEN), A., ii, 399.
 detection of, in lard (JEAN), A., ii, 455.
 examination of (LEVIN), A., ii, 454.

Oils. See also:—
Abies canadensis and *A. excelsa*, oils from.
Andropogon schœnanthus and *A. nardus*, oils from.
 Angelica oil.
 Aniseed, oil of.
 Bergamot, oil of.
 Cedarwood oil.
 Colza oil.
 Cotton-seed oil.
 Eucalyptus oil.
 Fennel oil.
 Geranium oil.
 Hempseed, oil of.
Hyoscyamus niger seed oil.
 Lard oil.
 Lemon-grass, oil of.
 Lignaloës, oil of.
 Limes, oil of.
 Linseed oil.
 Mustard, oil of.
 Nut oil.
 Olive oil.
 Origanum oil.
 Palm oil.
 Patchouli.
 Pelargonium oil.
Picea vulgaris, oil of.
Pinus sylvestris and *P. pumilio*, oils of.
 Poppy-seed oil.
 Rhodinol.
 Rosemary, oil of.
 Roses, oil of.

Oils. See:—

- Rosin oil.
- Santal wood oil.
- Secale cornutum*.
- Sesame oil.
- Strophanthus hispidus* seed oil.
- Thyme, oil of.
- Valerian, oil of.
- Whale oil.
- Wild marsh rosemary, oil of.
- Olefines, the chief products of electrolysis of fatty acids (HAMONET), A., i, 664.
- Oleic acid, action of sulphur on (ALTSCHUL), A., i, 126.
- alkali salts, behaviour of, with water (KRAFFT and WIGLOW), A., i, 80.
- cholesterylic salt of (HÜRTLE), A., ii, 485.
- Oligiste. See Hæmatite.
- Oligoclase from Mexico? (FOUQUÉ), A., ii, 532.
- from Thuringia (FROMME), A., ii, 370.
- Oligoclase-andesine from France (FOUQUÉ), A., ii, 532.
- Olivine from the Eifel (THADDÉEFF), A., ii, 372.
- from Norway (THADDÉEFF), A., ii, 372.
- Olivine group, composition and optical properties (PENFIELD and FORBES), A., ii, 373.
- composition, sp. gr., and isodimorphism in (THADDÉEFF), A., ii, 372.
- Olivine-andesite from New Zealand (SPEIGHT), A., ii, 192.
- Olive oil, oxidisability of (BISHOP), A., ii, 399.
- detection of paraffin in (CARPENTIER), A., ii, 452.
- Ommatic acid, preparation and properties of (ZOFF), A., i, 104.
- Onion, occurrence of quercetin in the outer skin of the (PERKIN and HUMMEL), T., 1295; P., 1896, 144.
- Onyx marbles (MERRILL), A., ii, 260.
- Opal, artificial precious (CESÀRO), A., ii, 253.
- from Bohemia (KATZER), A., ii, 187.
- from British Columbia (HOFFMANN), A., ii, 190.
- Opiananthranilic acid and its salts (LIEBERMANN), A., i, 683.
- Opianic acid (WEGSCHEIDER), A., i, 480.
- condensation of, with 1 : 3 : 2'-trimethylquinaldine (NENCKI), A., i, 256.
- methylic salts (WEGSCHEIDER), A., i, 480.

- Opianic acid, ψ -tropine salt of (LIEBERMANN), A., i, 683.
- ethylanilic lactone (LIEBERMANN), A., i, 233.
- ethylanilide. See Opianic acid ethylanilic lactone.
- methylketolide (LIEBERMANN), A., i, 683.
- β -naphthylamine, bromo- (LIEBERMANN), A., i, 682.
- β -naphthylamine, nitro- (LIEBERMANN), A., i, 682.
- α -naphthylamic lactone (LIEBERMANN), A., i, 233.
- β -naphthylamic lactone (LIEBERMANN), A., i, 233.
- naphthylamides of. See Opianic acid naphthylamic lactones.
- semicarbazone (LIEBERMANN), A., i, 232.
- methylic salt of (LIEBERMANN), A., i, 232.
- tetrahydroquinaldinic lactone (*Opianic tetrahydroquinaldide*) (LIEBERMANN), A., i, 233.
- tetrahydroquinolinic lactone (*Opianic tetrahydroquinolide*) (LIEBERMANN), A., i, 233.
- Opianic acid, bromo-, action of, on hydrocotarnine (LIEBERMANN), A., i, 711.
- nitro-, action of, on hydrocotarnine (LIEBERMANN), A., i, 711.
- Opian- β -naphthylamic acid and its sodium and methylic salts (LIEBERMANN), A., i, 233.
- nitro-, sodium salt of (LIEBERMANN), A., i, 682.
- Opianoximic acid anhydride (WEGSCHEIDER), A., i, 480.
- Opianyl-1 : 3 : 2'-trimethylquinoline and its platinochloride (NENCKI), A., i, 256.
- Opium, estimation of (DOTT), A., ii, 283.
- estimation of morphine in (KEBLER), A., ii, 403.
- Optical activity. See Light, rotatory power.
- Opoponax, examination of (BAUR), A., i, 57.
- Opuntia*, occurrence of galactan in (YOSHIMURA), A., ii, 60.
- Orange, basic constituents of bitter (JAHNS), A., i, 712.
- Orangite from Norway (SCHMELCK), A., ii, 186.
- Orcinol, amino-, and its hydrochloride (HENRICH), A., i, 477.
- dinitro- (HENRICH), A., i, 477.
- acetoxime (HENRICH), A., i, 477.
- oxime, isomerism of (HENRICH), A., i, 476.

- Ores, Austrian, analyses of (JOHN and EICHLEITER), A., ii, 252.
- Bavarian, analyses of (SCHWAGER and GÜMBEL), A., ii, 431.
- Canadian, analyses of (HOFFMANN), A., ii, 191, 259.
- Servian, analyses of (LOSANITSCH), A., ii, 252; (STANOJEVIĆ), A., ii, 255.
- Organic compounds, detection of chlorine, bromine, and iodine in (RAIKOW), A., ii, 70.
- estimation of iodine in (SCHUYTEN), A., ii, 71.
- estimation of nitrogen in, by the Kjeldahl process (CAUSSE), A., ii, 72.
- estimation of sulphur in (ASBÓTH), A., ii, 448.
- Organic salts, estimation of zinc in (VON RITTER), A., ii, 578.
- Organic matter, oxidisable, estimation of, in cyanide solutions (BETTEL), A., ii, 276.
- Origanum, oil, constituents of (GILDEMEISTER), A., i, 54.
- Origanum smyrniacum*, constituents of (GILDEMEISTER), A., i, 54.
- Ornithopus*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Ortho- and para- compounds, comparative actions of, on organisms (BOKORNY), A., ii, 668.
- Orthoclase from Bavaria (SCHWAGER and GÜMBEL), A., ii, 431.
- from Odenwald (CHELIUS), A., ii, 612.
- from Thuringia (FROMME), A., ii, 370.
- Osazone, $C_{18}H_{20}O_3N_4$, derived from quercitol (KILIANI and SCHÄFER), A., i, 586.
- Osazones of furfuroids from barley-straw (CROSS, BEVAN, and SMITH), T., 1607; P., 1896, 174.
- Oscillaria leptotricha*, crystalline colouring matter from (MOLISCH), A., i, 660.
- Osmium:—Amidochlorosmic acid, potassium salt of (BRIZARD), A., ii, 654.
- Osmosis, initial rate of, in various liquids (LAZARUS-BARLOW), A., ii, 196.
- of blood-serum, initial rate of (BARLOW), A., ii, 664.
- through walls of living blood-vessels (LEATHES), A., ii, 196.
- Osmotic pressure, theory of (FITZGERALD), T., 905; P., 1896, 25.
- mathematical treatment of (VAN LAAR), A., ii, 154.
- Osmotic pressure and the law of active masses, connection between (JAKOWKIN), A., ii, 593.
- relation of, to initial rate of osmosis (LAZARUS-BARLOW), A., ii, 196.
- of blood-plasma (KOEPE), A., ii, 376.
- effects of changes of, in the blood (LEATHES), A., ii, 196.
- relation of, to secretion of urine (TAMANN), A., ii, 618.
- Osoctriazonedicarboxylic acid. See Azimidoethylenedicarboxylic acid.
- Ostomalacia, excretion of calcium salts in (REY), A., ii, 489.
- Ottrelite from Maryland (EAKINS), A., ii, 39.
- Ovarian cyst, analysis of liquid from (LIEBLEIN), A., ii, 263.
- Oxalacetic acid (MICHAEL and BUCHER), A., i, 85.
- from the ethylic salt and from ethylic asdiethoxysuccinate (MICHAEL and BUCHER), A., i, 599.
- from ethylic ethoxyfumarate and ethoxymaleic acid (MICHAEL and BUCHER), A., i, 599.
- constitution of (MICHAEL and BUCHER), A., i, 600.
- Oxalacetic acid, ethylic salt of, reduction of (WISLICHENUS), A., i, 672.
- Oxalic acid, action of light on a solution of ferric chloride and (LEMOINE), A., ii, 285.
- freezing points of aqueous solutions of (PONSOT), A., ii, 412.
- absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
- action of inorganic acidic metallic oxides on (ROSENHEIM), A., i, 278, 348.
- action of uranyl oxalate on (FAY), A., i, 465.
- amount and source of, in urine (DUNLOP), A., ii, 263.
- amount of, in nodules (STOKLASA), A., ii, 205.
- Oxalic acid, aluminium, and potassium aluminium salts of (ROSENHEIM), A., i, 278, 279.
- chromium, and chromium potassium, salts of (ROSENHEIM), A., i, 279, 280, 348.
- iron and alkali iron, salts of (ROSENHEIM), A., i, 280, 348.
- uranous salt of (FAY), A., i, 464.
- Oxalic acid, aniline salt of (HOFMANN LECTURE), T., 641.
- butylamine salt (BERG), A., i, 8.
- ethylic salt, melting point of (v. SCHNEIDER), A., ii, 290.

Oxalic acid, ethylic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
 action of sodium on (FREY), A., ii, 107.
 condensation of, with bromobenzene (FREY), A., i, 99.
 condensation of, with piperazine (ROSDALSKY), A., i, 257.
 reduction of (WISLICENUS), A., i, 672.
 Oxalic acid, amino-, oxime of, identity of, with hydroxyoxamide (SCHIFF and MONSACCHI), A., i, 209.
 imido, ethylic salt (NEF), A., i, 73.
 diimido-, ethylic and diethylic salts (NEF), A., i, 72.
 Oxalic acid, detection of, in putrefactive tissues (VITALI), A., ii, 454.
 estimation of, with potassium permanganate (BERTHELOT), A., ii, 70.
 Oxalmethylbutylhydrazide (FRANCHIMONT and VAN ERP), A., i, 275.
 Oxalyldimesitylic oxide (CLAISEN, TINGLE, and KERSTIENS), A., i, 562.
 Oxalyldiphenylguanidine, preparation of (HOFMANN LECTURE), T., 653.
 Oxallylthiouramil (FISCHER), A., i, 142.
 Oxamethane, action of phosphorus trichloride on (LACHMANN), A., i, 601.
 Oxamide, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
 tartrate (TOPIN), A., i, 283.
 Ox-bile, preparation of bile acids from, and their colour reactions (RICHTER), A., i, 111.
 Oxides, metallic, ignited, solution of (BORNTRÄGER), A., ii, 502.
 Oxime, $C_{10}H_{18}BrO_2N$, from dibromomenthone (BECKMANN and EICKELBERG), A., i, 313.
 $C_{13}H_{15}NO$, from the aldehyde condensation product of cinnamaldehyde and methyl ethyl ketone (SCHOLTZ), A., i, 368.
 $C_{17}H_{17}NO$, from the ketone condensation product of cinnamylideneacetone and benzaldehyde (SCHOLTZ), A., i, 368.
 Oximes, acidity of (GERILOWSKI and HANTZSCH), A., i, 374.
 Oximes. See also :—
 o-Acetamidobenzophenoneoxime.
 Acetic acid, oxime of.
 Acetoacetic acid, ethylic salt, oxime of.
 Acetoacetate amphidioxime, ethylic salt.

Oximes. See :—

Acetoacetic anilide, oxime of.
 γ -Acetobutyric acid, oxime of.
 Acetone-oxime.
 Acetoxime.
 Acetylbutylic alcohol, oxime of.
 Acetylisedioxime.
 Acetylisopropylketopentamethylene, dioxime of.
 Aldehydoeitrazinic acid oxime.
 Anisaldoxime.
 Anisyl ethyl ketoxime.
 Anthraquinoneoxime.
 Azoxyphenyl *p*-tolyl ketoxime.
 Benzaldoximes.
 Benzenedioxime (quinonedioxime).
 Benzenylaminioxime.
 Benzenyloxime.
 Benzophenoneoxime.
 Benzoylumaroneoxime.
 Benzoylmethylic phenylic ether oxime.
 Benzyl methyl ketoxime and dioxime.
 Benzylidenacenaphtheneoxime.
 Benzylideneacetoacetic acid oxime.
 Benzylidenediacetonaminioxime.
 Benzylidenementhoneoxime.
 Benzylidenemethylhexenoneoxime.
 Butyric acid, oxime of.
 Butyrolactonedioxime.
 Camphoroxime.
 Chrysoketoxime.
 2 : 4-Diethoxybenzoylformic acid oxime.
 Dimethylglyoxime.
 Dimethyl-2 : 5-hexanol-3-one-4, oxime of.
 2 : 6-Dimethyl-3-oximidocaneic acid.
 Diphenylene ketone oxime.
ψ-Diphenylene ketone oxime.
 4 : 5-Diphenyloctanedione, 2 : 7-, dioxime.
 Ethenylamidoxime, cyan-.
 Glucosamine hydrochloride, oxime of.
 Homoterpenylic acid, oxime of.
 Hydrochlorocarboxime.
 Hydroxybenzaldoximes.
 Hydroxydihydrocarboxime.
 Hydroxynaphthaquinoneimide, oxime of.
 Hydroxyquinolinequinoneoxime.
 Ketodihydrophenotriazinoxime.
 Ketone, $C_{14}H_{22}O$, oxime of.
 Ketopinic acid, oxime of.
 Malonenediamidoxime.
 Malonic acid, oxime of.
 Menthoneoxime.
d- and *l*-Menthoneoximes.
 Menthoximic acid.
 Mesitylaldoxime.
 o-Methoxybenzophenoneoxime.
 Methyl anilidobutyl ketoxime.

Oximes. See:—

- Methyl benzamidobutyl ketoxime.
- Methyl α -ethylpropyl ketoxime.
- Methylbenzhydroximic acid.
- Methylbutyrolactone, bromo-, oxime of.
- Methylisobutyrylketopentamethyl-ene, dioxime of.
- 3-Methyl-5 isobutyl- Δ_2 -cyclo-hexenone and its carboxylic acids, oximes of.
- Methyldihydroresorcinoldioxime.
- Methylglyoxime.
- Methylcyclohexanone, isonitroso-.
- Methylcyclohexenoneoxime.
- 3-Methyl-5-hexyl- Δ_2 -cyclohexenone and its carboxylic acids, oximes of.
- n*-Methyltroponinoxime.
- Naphthaquinoneoxime.
- α -Naphthylglyoxylic acid oxime.
- β -Naphthyl benzoylmethylic ether, oxime of.
- Bisnitrosotetrahydrocarboxime.
- Nopinoneoxime.
- Nortropinonoxime.
- Oxalic acid, amino-, oxime of.
- Oxydimethylnaphthol oxime.
- Papaveraldoxime.
- Phenyl *p*-tolyl ketoxime.
- Phenyl *m*-xylyl ketoxime.
- Phenylacetoxime.
- iso*-Phoroneoxime.
- Pinonic acid, oxime of.
- α -Pinonic acid, oxime of.
- Pinononic acid, oxime of.
- Piperonaloxime.
- Propionic acid, oxime of.
- Propionylglycollic acid, oxime of.
- 5-*iso*-Propylheptan-2-onoic acid, oxime of.
- Pulegoneoxime.
- Pulegone, isonitroso-.
- Pyridineacetoxime.
- Rhodinaldoxime.
- Triacetamininoxime.
- Trimethylbenzaldoximes.
- Tropinoneoxime.
- Vinyl diacetaminineoxime.
- Oximidoacetoacetic acid and its salts (HANTZSCH and WILD), A., i, 285.
- action of alkalis on (HANTZSCH and WILD), A., i, 285.
- action of hydriodic acid on (HANTZSCH and WILD), A., i, 285.
- amide of (HANTZSCH and WILD), A., i, 285.
- Oximidopropionic-acetic acid and salts (HANTZSCH and WILD), A., i, 285.
- action of hydriodic acid on (HANTZSCH and WILD), A., i, 285.
- Oxyacanthine, properties and salts of (POMMERHNE), A., i, 67.

- Oxyacanthine, benzoyl derivative of (POMMERHNE), A., i, 67.
- Oxycellulose from fir-wood, non-identity of, with other oxycelluloses (DE HAAS and TOLLENS), A., i, 6.
- action of hydrochloric acid on (TOLLENS), A., i, 7.
- Oxychlorophosphines. See Phosphines, oxychloro-.
- Oxydase, a generic term for laccase, tyrosinase, &c. (BERTRAND), A., ii, 571.
- Oxygen of atmosphere, origin of (PHIPSON), A., ii, 265.
- atomic weight of (THOMSEN), A., ii, 471; (MORLEY), A., ii, 640.
- and hydrogen, ratio of their atomic weights (THOMSEN), A., ii, 244.
- preparation of (VITALI), A., ii, 92.
- behaviour of, when submitted to the electric discharge (COLLIE and RAMSAY), A., ii, 634.
- vapour pressures of liquid (ESTREICHER), A., ii, 150.
- density of (THOMSEN), A., ii, 471; (MORLEY), A., ii, 518.
- specific gravity of, and combustion in liquid (DEWAR), P., 1895, 226.
- velocity of attraction of, for hydrogen (TECLU), A., ii, 14.
- combination of hydrogen with (MEYER and RAUM), A., ii, 162.
- rate of combination of hydrogen with (GAUTIER and HÉLIER), A., ii, 416.
- quadrivalency of (BRÜHL), A., ii, 163.
- quadrivalent, organic compounds containing (ZECCHINI), A., i, 197.
- spectroscopic examination of compound of hæmoglobin with (GAMGEE), A., i, 713.
- physiological action of want of (LOEB), A., ii, 318.
- evolution of, by plants (PHIPSON), A., ii, 265.
- influence of, on fermentation by yeast (RAPP), A., ii, 668.
- Oxygen, estimation of, by pyrogallol, source of error in (CLOWES), P., 1895, 200.
- dissolved, estimation of (ROMIJN), A., ii, 579.
- estimation of, in air, &c. (KREIDER), A., ii, 124.
- estimation of, in commercial copper (BLOUNT), A., ii, 333.
- Oxygranatanine, its salts and benzoyl derivative (CIAMICIAN and SILBER), A., i, 397.
- Oxyhæmoglobin crystals, preparation of (ARTHUS), A., i, 400.
- from horses' blood (JUTT), A., i, 584.

Oxyhæmoglobin, spectroscopic examination of (GAMGEE), A., i, 713.
 Oxymenthylie acid (BECKMANN and MEHRLÄNDER), A., i, 312.
 β -Oxymethylpurin (FISCHER), A., i, 13, 14.
 dichlor- (FISCHER), A., i, 13.
 Oxyphosphazoanilides, probable constitution of (MICHAELIS and SILBERSTEIN), A., i, 344.
 Oxyphosphazobenzeneanilide and its ethylic and phenylic salts (MICHAELIS and SILBERSTEIN), A., i, 344.
 decomposition products of (MICHAELIS and SILBERSTEIN), A., i, 344.
 Oxyphosphazo-*m*-bromobenzenebromanilide and its ethylic salt (MICHAELIS and SILBERSTEIN), A., i, 344.
 compound of, with aniline and with phenol (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*m*-bromobenzenedibromanilide (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*m*-bromobenzenetri-bromanilide (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*m*-bromobenzenetri-chloranilide (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*m*-chlorobenzenechloranilide (MICHAELIS and SILBERSTEIN), A., i, 344.
 Oxyphosphazo-*o*-toluenetoluidide (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*p*-toluenetoluidide (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxyphosphazo-*p*-toluenebromo-*p*-toluidide (MICHAELIS and SILBERSTEIN), A., i, 345.
 action of acetic acid and of phenol on (MICHAELIS and SILBERSTEIN), A., i, 345.
 Oxysulphazotic acid. See Sulphur-nitrosodisulphonie acid.
 Ozone, generator for (SÉGUY), A., ii, 518.
 formation of, by the action of heated metallic oxides on oxygen (BRUNCK), A., ii, 93.
 formation of, from potassium chlorate and manganese dioxide (BRUNCK), A., ii, 93.
 formation of, by distilling permanganate and sulphuric acid in a vacuum (FRYE), A., ii, 417.
 absence of, in oxygen from manganese dioxide and potassium chlorate (MCLEOD), T., 1015; P., 1896, 104.

Ozone, apparatus for demonstrating the properties of (NEWTN), T., 1298; P., 1896, 139.
 cause of the mist produced by (ENGLER and WILD), A., ii, 558.
 action of, on potassium iodide (BRUNCK), A., ii, 93.
 influence of, on the combustibility of dry carbonic oxide (DIXON), T., 785; P., 1896, 56.
 detection of, in air (ENGLER and WILD), A., ii, 574.
 separation of hydrogen peroxide from (ENGLER and WILD), A., ii, 574.
 Ozotoluene (RENARD), A., i, 149.
 Ozo-*o*-xylene (RENARD), A., i, 149.

P.

Pachyma Cocos, analysis of (WINTERSTEIN), A., ii, 63.
 Paints, examination of (HEFELMANN and MANN), A., ii, 680.
 Palladium, melting point of (HOLBORN and WIEN), A., ii, 87.
 absorption of helium by (TILDEN), A., ii, 656.
 solubility of carbon in (MOISSAN), A., ii, 610.
 Palladium hydride, electrical conductivity of (KRAKAU), A., ii, 5.
 dissociation pressure of (KRAKAU), A., ii, 5.
 Palm oil, oxidisability of (BISHOP), A., ii, 399.
 Palmitic acid, action of light on (RICHARDSON and FORTEY), T., 1349.
 behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.
 cholesterylic salt of (HÜRTHLE), A., ii, 485.
 Palmitic chloride, action of lead thioeyanate on (DIXON), T., 1594.
n-Palmityl-*v*-phenylbenzylthiourea, and action of silver nitrate on (DIXON), T., 1598; P., 1896, 223.
a-Palmityl-*b*-phenylbenzylurea (DIXON), T., 1598; P., 1896, 223.
n-Palmityl-*v*-phenylmethylthiourea (DIXON), T., 1597; P., 1896, 223.
ab-Palmitylphenylthiocarbamide (DIXON), T., 1595; P., 1896, 223.
 Palmitylphenylurea (DIXON), T., 1596; P., 1896, 223.
 Palmitylphytosterin (HESSE), A., i, 180.
 Palmitylthiocarbamide, action of silver nitrate on (DIXON), T., 1596.

- Palmitylthiocarbimide (DIXON), T., 1594; P., 1896, 223.
 action of aniline, *o*- and *p*-toluidine, methylaniline, and benzyaniline on (DIXON), T., 1595—1598.
ab-Palmityl-*o*-tolylthiocarbamide, and action of silver nitrate on (DIXON), T., 1596; P., 1896, 223.
ab-Palmityl-*p*-tolylthiocarbamide, and action of silver nitrate on (DIXON), T., 1597; P., 1896, 223.
ab-Palmityl-*o*-tolylurea (DIXON), T., 1596; P., 1896, 223.
ab-Palmityl-*p*-tolylurea (DIXON), T., 1597; P., 1896, 223.
 Panaresinotannol (BAUR), A., i, 57.
 α - and β -Panax-resen (BAUR), A., i, 57.
 Pancreas, solubility of the amylolytic ferment of the, in alcohol (DASTRE), A., i, 398.
 Pancreatic juice, action of, on milk (HALLIBURTON and BRODIE), A., ii, 662.
 action of, on trehalose, cane sugar, and maltose (BOURQUELOT and GLEY), A., ii, 315.
Pangium edule, formation of hydrocyanic acid in and presence of a reducing sugar in (TRETCH), A., ii, 327.
 Papaveraldoxime, stereoisomerism of (HIRSCH), A., i, 191.
 hydrochloride and dihydrochloride of (HIRSCH), A., i, 191.
 Papaveraldylamine, from papaveraldoxime (HIRSCH), A., i, 192.
 Papaverine, behaviour of, in the Stas-Otto process (OTTO), A., ii, 508.
 Papaverinic acid, methyl derivative of and methylbetaine of (HERZIG and MEYER), A., i, 68.
 Paper, detection of wood pulp in (WOLESKY), A., ii, 505.
Papilionaceæ, nitrogen assimilation of some (BILLIVILLER), A., ii, 440.
 Para- and ortho-compounds, comparative actions of, on organisms (BOKORNY), A., ii, 668.
 Parabanic acid, physiological action of (LUSINI), A., ii, 492.
 Paracasein. See Casein.
 Paraffin. See Mineral oil.
 Paraffin, C₂₉H₆₀, from Charas (WOOD, SPIVEY, and EASTERFIELD), T., 543; P., 1896, 76.
 Paragalactan. See Galactan.
 Paramyosinogen. See Myosinogen.
 Paranaphthalene. See Anthracene.
 Paraniline, discovery of (HOFMANN LECTURE), T., 689.
 Paranthracene. See Dianthracene.
Parmelia encausta and *P. pertusa*, occurrence of atranoric acid in (ZOPF), A., i, 103.
Parmeliopsis hyperopta, occurrence of atranoric acid in (ZOPF), A., i, 103.
 Partition coefficient. See Equilibrium.
 Patchouli-camphor, rotatory power of, in the crystalline and liquid states (TRAUBE), A., ii, 509.
 Patchouli oil, analysis of (HIRSCH-SOHN), A., ii, 223.
 "Patent blue" (PRUD'HOMME), A., i, 485.
 Paucine, properties of, and its salts (MERCK), A., i, 68.
 action of potash and concentrated hydrochloric acid on (MERCK), A., i, 68.
 Peach-kernel, proteids of the (OSBORNE and CAMPBELL), A., i, 715.
 Pearceite from Montana (PENFIELD), A., ii, 658.
 Peas. See Agricultural chemistry. (Appendix.)
 Peat in fermentative changes in water, action of (ADENEY), A., ii, 324.
 Pectase in plants (BERTRAND and MAL-LÉVRE), A., ii, 267.
 Pectins, constitution of (CROSS), A., i, 77.
 Pectin-substances, analogy in composition of, to carbohydrates (DE HAAS and TOLLENS), A., i, 7.
 probable constitution of (TOLLENS), A., i, 7.
 products of hydrolysis of (DE HAAS and TOLLENS), A., i, 7.
 Pelagine (GRIFFITHS and PLATT), A., i, 182.
 Pelargonic acid. See Ennoic acid.
 Pelargonium oil. See Geranium oil.
 Pelargylaminoazelaic acid (SPIECKERMANN), A., i, 410.
 Pelargylaminobrassylic acid, hydrolysis of (SPIECKERMANN), A., i, 410.
 ψ -Pelletierine. See Granatonine.
 Pellotine, benzoyl derivatives of (HEFFTER), A., i, 267.
Penicillium glaucum, assimilation of nitrogen by (PURIEWITSCH), A., ii, 571.
 mineral nutrition of (BENECKE), A., ii, 572.
 extraction of maltase from (BOURQUELOT), A., i, 111.
 inversion of cane sugar by (FERMI and MONTESANO), A., ii, 493.
 Pentacarbon rings, synthesis of (JAPP and MURRAY), P., 1896, 146.
 Pentacetyltetrabromomorin, preparation of (PERKIN and BABLICH), T., 795; P., 1896, 186.

- Pentaclethra macrophylla*, panceine the alkaloid of (MERCK), A., i, 68.
- Pentadecic acid, bromo- (CIAMICIAN and SILBER), A., i, 596.
- iodo- (CIAMICIAN and SILBER), A., i, 596.
- Pentaglycol, action of hydriodic acid and phosphorus on (APEL and TOLLENS), A., i, 115.
- iodhydrin (APEL and TOLLENS), A., i, 115.
- Pentamethenylacetic acid. See *cyclo-Pentylacetic acid*.
- Pentamethenylmalonic acid. See *cyclo-Pentylmalonic acid*.
- Pentamethylaniline, nitrile and *iso*-nitrile obtained from (HOFMANN LECTURE), T., 710.
- Pentamethylbenzoylpropionic acid (MUHR), A., i, 232.
- Pentamethylaehydrobrazilin (HERZIG), A., i, 379.
- Pentamethyldehydrohæmatoxylin (HERZIG), A., i, 379.
- Pentamethylenetetramine, *diamino*- (DUDEN and SCHARFF), A., i, 122, 123.
- dinitroso*-, action of nascent hydrogen on (DUDEN and SCHARFF), A., i, 122.
- Pentamethylenetetraminebisdiazobenzenesulphonic acid, salts of (DUDEN and SCHARFF), A., i, 123.
- Pentane, $\beta\beta$ -dinitro- (BORN), A., i, 198.
- γ -dinitro- (BORN), A., i, 198.
- β -nitro- β -nitroso- (BORN), A., i, 198.
- iso*-Pentane, $\beta\beta$ -dinitro- (BORN), A., i, 199.
- β -nitro- β -nitroso- (BORN), A., i, 199.
- Pentanedioic-3-dimethyloic acid. See Propanepentacarboxylic acid.
- Pentanedioictetramethyloic-2 : 3 : 3 : 4-acid. See Propanehexacarboxylic acid.
- Pentane- $\alpha\gamma\gamma\alpha$ -tetracarboxylic acid (HEINKE and PERKIN), T., 1509.
- action of heat on (HEINKE and PERKIN), T., 1509.
- ethylic salt (HEINKE and PERKIN), T., 1509.
- Pentanetetronal. See Lyxose.
- PENTANETRICARBOXYLIC ACIDS :—
- n*-Pentane- $\alpha\gamma\alpha_1$ -tricarboxylic acid (HEINKE and PERKIN), T., 1510.
- Dimethylpropane- $\alpha\alpha\alpha_1$ -tricarboxylic acid, action of heat on (PERKIN and GOODWIN), T., 1474.
- and salts (PERKIN and GOODWIN), T., 1473.
- ethylic salt (PERKIN and GOODWIN), T., 1472; P., 1896, 170.

- PENTANETRICARBOXYLIC ACIDS :—
- Dimethylpropane- $\alpha\alpha\alpha_1$ -tricarboxylic acid, sodio-, ethylic salt, action of phenoxyethylic bromide on (PERKIN), T., 1500; P., 1896, 170.
- Pentaphenyldiguanide : its hydrochloride and platinochloride (MACKWALD), A., i, 30.
- Pentene, keto-. See Ketopentene.
- cyclo*-Pentene, *dibromo*- (KRAEMER and SPILKER), A., i, 290.
- tetrabromo*- (KRAEMER and SPILKER), A., i, 290.
- chloro*- (KRAEMER and SPILKER), A., i, 290.
- trichloro*- (KRAEMER and SPILKER), A., i, 290.
- tetrachloro*- (KRAEMER and SPILKER), A., i, 290.
- PENTENOIC ACIDS :—
- Propylideneacetic acid (SPENZER), A., i, 128.
- $\beta\beta$ -Dimethylacrylic acid (PERKIN and GOODWIN), T., 1469; P., 1896, 170.
- ethylic salt (PERKIN and GOODWIN), T., 1470, 1471.
- action of ethylic sodiomalonate on (PERKIN and GOODWIN), T., 1472; P., 1896, 170.
- Penterythritol, action of sulphur chloride on (BOUGAULT), A., i, 662.
- dichlorhydrin (BOUGAULT), A., i, 662.
- bisulphite, and action of sulphur chloride on (BOUGAULT), A., i, 662, 663.
- Penterithrytoldibenzal (APEL and TOLLENS), A., i, 115.
- Penterythritoltetrabromhydrin, reduction of (GUSTAVSON), A., i, 669.
- Pentiazoline, γ -bromo- μ -amido- (β -bromotrimethylene- ψn -thiourea), and its constitution of (DIXON), T., 19, 23, 24; P., 1895, 216.
- action of hydrochloric acid on (DIXON), T., 20; P., 1895, 215.
- action of nascent hydrogen on (DIXON), T., 24.
- action of picric acid on (DIXON), T., 21; P., 1895, 216.
- action of hydrobromic acid on (DIXON), T., 20; P., 1895, 215.
- γ -iodo- μ -amido- (β -iodotrimethylene- ψn -thiourea), pierate of, and action of silver nitrate on (DIXON), T., 26; P., 1895, 216.
- PENTINENE :—
- Dimethylisoallylene (IPATIEFF), A., i, 402.
- action of hydrogen bromide on (IPATIEFF), A., i, 330.

- Pentosans, absorption of, in the alimentary canal (WEISKE), A., ii, 375.
 estimation of, by the furfuraldehyde method (MANN, KRÜGER, and TOLLENS), A., ii, 393; (STIFT), A., ii, 453; (TOLLENS), A., ii, 580.
 estimation of, in sugar beet, &c. (STIFT), A., ii, 79.
- Pentose, change of hexose to, derivatives in cereal cellulose (CROSS, BEVAN, and SMITH), T., 1609; P., 1896, 175.
 presence of, in urine (SALKOWSKI), A., ii, 490.
- Pentose-monoformal, formation of, from a hexose in plants (CROSS, BEVAN, and SMITH), T., 1610; P., 1896, 175.
- Pentoses, action of alkalis on (CROSS, BEVAN, and SMITH), T., 816; P., 1896, 96.
 formation of, in plants (GOETZE and PFEIFFER), A., ii, 443.
 origin of, in plants (CROSS, BEVAN, and SMITH), T., 805; P., 1896, 96.
 oxidation of, by hydrogen peroxide (CROSS, BEVAN, and SMITH), T., 814; P., 1896, 96.
 detection of, by precipitation (TOLLENS), A., ii, 504.
 estimation of, by the furfuraldehyde method (MANN, KRÜGER, and TOLLENS), A., ii, 393; (STIFT), A., ii, 453; (TOLLENS), A., ii, 580.
 estimation of, in sugar beet, &c. (STIFT), A., ii, 79.
- cyclo*-Pentylacetic acid and its salts (VERWEY), A., i, 671.
 ethylic salt of (VERWEY), A., i, 671.
- cyclo*-Pentylmalonic acid and its salts (VERWEY), A., i, 671.
 ethylic salt of (VERWEY), A., i, 671.
- Peonol, bromo- [OMe : OH : CO = 4 : 2 : 1] (FRIEDLÄNDER and RÜDT), A., i, 697.
- Pepper, action of, on digestion (GOTTLIEB), A., ii, 42.
 analysis of (BUSSE), A., ii, 82.
- Pepsin, solubility of, in alcohol (DASTRE), A., i, 398.
 influence of salts on the activity of (DASTRE), A., ii, 118.
- Peptone, action of acetic anhydride on (SCHRÖTTER), A., i, 515.
 absorption of, by the intestine (REID), A., ii, 318.
 absorption of, in the small intestine (FRIEDLÄNDER), A., ii, 536.
 nutritive value of (ELLINGER), A., ii, 536.
 injections, effects of, on blood (STARLING), A., ii, 197.
- Peptone, tests for (SCHRÖTTER), A., i, 112.
 estimation of (KÖNIG and BÖMER), A., ii, 83.
 estimation of, in beerwort (SCHJERNING), A., ii, 631.
 estimation of, in cheese (STUTZER), A., ii, 684.
 commercial, estimation of gelatin in (STUTZER), A., ii, 84.
- Peptones. See further Antipeptone; Gland-peptone; Propeptone.
- Percylite, artificial (FRIEDEL), A., ii, 32.
- Perilla nankinensis*, dyes of (WEIGERT), A., i, 388.
- Periodic arrangement of the elements, and colour (LEA), A., ii, 639.
 character of the colour of elementary ions (LEA), A., ii, 594.
- Periodic law, L. Meyer's contributions to the (BEDSON), T., 1414; P., 1896, 119.
- Periodic system, solubility and diffusivity of metals in mercury related to their position in the (HUMPHREYS), T., 1683; P., 1896, 220.
 supposed group of inactive elements (THOMSEN), A., ii, 16.
 position of tellurium in the (RETGERS), A., ii, 520.
 classification of minerals according to (SCHULZE), A., ii, 566.
- Periodicity of the colour of ions (THOMSEN), A., ii, 16.
 of the properties of the elements, analytical representation of the (GOLDHAMMER), A., ii, 471.
 of the properties of the elements, a function corresponding with the (FLAVITZKY), A., ii, 355.
- "Perkin's green," discovery of (HOFMANN LECTURE), T., 618.
- Peronospora*, effect of copper salts on (BERLESE and SOSTEGNI), A., ii, 267.
- Petroleum. See Mineral oil.
- Phaselin, preparation and properties of (OSBORNE), A., i, 455.
- Phaseolin, preparation and properties of (OSBORNE), A., i, 454.
- Phaseolus multiflorus*, effect of alkaloids on the germination of seeds of (MOSSO), A., ii, 326.
vulgaris, proteids of (OSBORNE), A., i, 454.
- Phases, applications of the rule of (MEYERHOFFER), A., ii, 414.
- Phellandrene nitrite, reduction of (WALLACH and HERBIG), A., i, 101.
 nitro- (WALLACH and HERBIG), A., i, 101.

- d*-Phellandrene, source of (WALLACH and HERBIG), A., i, 101.
- l*-Phellandrene, source of (WALLACH and HERBIG), A., i, 101.
- Phenacetic acid. See Phenylacetic acid.
- Phenaceturic acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- Phenacetyl. See Phenylacetyl.
- Phenacylacetic acid. See β -Benzoylpropionic acid.
- Phenacyl bromide, from diazoacetophenone (ANGELI and RIMINI), A., i, 363.
- Phenacyl-*o*-benzoiesulphinide (ECKENROTH and KLEIN), A., i, 304.
- Phenacyl-*o*-benzoiesulphinide hydr-azone (ECKENROTH and KLEIN), A., i, 304.
- Phenacyldeoxypiperonoin, hydrazone of (SMITH and RANSOM), A., i, 322.
- Phenacylsuccinic acid, preparation of (EMERY), A., i, 436.
- Phenacylsuccinic anhydride (EMERY), A., i, 436.
- Phenacylsulphamidobenzoic acid (ECKENROTH and KLEIN), A., i, 304.
- Phenanthrene, synthesis of (PSCHORR), A., i, 303.
- fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.
- magnetic rotatory power, &c., of (PERKIN), T., 1088, 1151, 1196, 1242.
- heat of solution of, in ethylic alcohol and toluene (SPEYERS), A., ii, 411.
- Phenazine dyes, nomenclature of (JAUBERT), A., i, 325.
- Phenazyldiphenyldisulphone (HINSBERG and HIMMELSCHNEIN), A., i, 685.
- Phenazylphenylsulphone (HINSBERG and HIMMELSCHNEIN), A., i, 684.
- iso*-Phenethylmalic acid. See $\alpha\beta$ -Hydroxydiphenylbutyric acid.
- p*-Phenetidine, melting point of (v. SCHNEIDER), A., ii, 290.
- β -Phenetidylcrotonic acid, ethylic salt of (WENGHÖFFER), A., i, 360.
- Phenetol (*phenyl ethyl oxide*), magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1186, 1240.
- o*-Phenetolazo-*p*-phenetol, reduction of (JACOBSEN and MEYER), A., i, 27.
- m*-Phenetolazo-*p*-phenetol, reduction of (JACOBSEN and MEYER), A., i, 27.
- p*-Phenetolazo-*p*-phenetol, reduction of (JACOBSEN and MEYER), A., i, 27.
- o*-Phenetolazo-*p*-phenol (JACOBSEN and MEYER), A., i, 27.
- m*-Phenetolazo-*p*-phenol (JACOBSEN and MEYER), A., i, 27.
- p*-Phenetolazo-*p*-phenol (JACOBSEN and MEYER), A., i, 27.
- 3'-*p*-Phenetyldihydro- β -phenotriazine and its salts (BUSCH and HARTMANN), A., i, 160.
- 3'-Phenetylketotetrahydroquinazoline (BUSCH and HARTMANN), A., i, 160.
- 3'-*p*-Phenethylthiotetrahydroquinazoline (BUSCH and HARTMANN), A., i, 160.
- Phenimeisatin, 2-amino-, and its acetyl derivative (SCHUNCK and MARCHLEWSKI), A., i, 235.
- Phenissic acid, chloro-. See Phenol, trichloro-.
- Phenol, isolation of, from coal-tar (HOFMANN LECTURE), T., 597.
- composition of (HOFMANN LECTURE), T., 641.
- properties of (HOFMANN LECTURE), T., 654.
- magnetic rotatory power, &c., of (PERKIN), T., 1064, 1090, 1181, 1239.
- effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 474.
- compound of, with aluminium chloride (PERRIER), A., i, 353.
- estimation of, in soaps and disinfectants (FRESENIUS and MAKIN), A., ii, 580.
- Phenol, *o*-amino-, decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
- p*-amino- (PLANCHER), A., i, 358.
- decomposition of, with sodium hypochlorite (DE CONINCK), A., i, 364.
- benzyl ether of, and its acetyl derivative (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- 1 : 3 : 5-*tribromo*-, compound of, with nitrosodimethylaniline. See Dimethylaniline.
- 2 : 4 : 6-bromodinitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1326; P., 1896, 163.
- 4 : 6 : 2-dibromonitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1329.
- 2 : 4 : 6-bromonitramino-, and its acetyl derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1326; P., 1896, 163.
- o*-chloro-, compound of, with aluminium chloride (PERRIER), A., i, 354.
- p*-chloro-, compound of, with aluminium chloride (PERRIER), A., i, 354.

- Phenol, 2 : 4 : 6-*trichloro*-, preparation of (HOFMANN LECTURE), T., 641.
 action of phosphorus pentachloride on (ZAHARIA), A., i, 646.
 hydrogen phosphate of, and its salts (ZAHARIA), A., i, 646.
 compound of, with nitrosodimethylaniline. See Dimethylaniline.
- α*-hexachloro-, dichloride (BARRAL), A., i, 91.
β-hexachloro-, dichloride (BARRAL), A., i, 91.
γ-hexachloro-, dichloride (BARRAL), A., i, 91.
- 2-chloro-4-nitro-, and its benzoyl and acetyl derivatives (MELDOLA, WOOLCOTT, and WRAY), T., 1328; P., 1896, 164.
 2-chloro-5-nitro-, and its benzoyl derivative (MELDOLA, WOOLCOTT, and WRAY), T., 1325; P., 1896, 163.
 4-chloro-3-nitro-, and its benzoyl and acetyl derivatives (MELDOLA, WOOLCOTT, and WRAY), T., 1322; P., 1896, 163.
 chlorodinitro-derivatives of (MELDOLA, WOOLCOTT, and WRAY), T., 1323.
 2-chloro-4 : 6-dinitro- (MELDOLA, WOOLCOTT, and WRAY), T., 1328.
 2 : 4 : 6-chloronitramino- (MELDOLA, WOOLCOTT, and WRAY), T., 1328.
triiodo-, preparation of (EDELEANU and ENESCU), A., i, 360.
 compound obtained in the preparation of (EDELEANU and ENESCU), A., i, 360.
o-nitro-, discovery of (HOFMANN LECTURE), T., 698.
 heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.
 effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
 compound of, with aluminium chloride (PERRIER), A., i, 353.
p-nitro- (HILL and TORRAY), A., i, 90.
 electrolytic reduction of (NOYES and DORRANCE), A., i, 22.
 heat of combustion of (MATIGNON and DELIGNY), A., ii, 88.
 compound of, with aluminium chloride (PERRIER), A., i, 353.
- 2 : 4-dinitro- (DIEPOLDER), A., i, 615.
 4-nitro-2-amino- (MELDOLA, WOOLCOTT, and WRAY), T., 1328; P., 1896, 164.
- Phenol, 5-nitro-2-amino- (MELDOLA, WOOLCOTT, and WRAY), T., 1325; P., 1896, 163.
 4-5-dinitro-2-amino- (MELDOLA, WOOLCOTT, and WRAY), T., 1325.
 5-nitro-3 : 2-diazoxy- (MELDOLA, WOOLCOTT, and WRAY), T., 1334; P., 1896, 164.
 sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- Phenol, a, obtained by action of sodium ethoxide on apiole (CIAMICIAN and SILBER), A., i, 608.
- Phenolphthalein, refraction equivalent of (ANDERLINI), A., ii, 229.
 explanation of its behaviour towards alkalis in alcoholic solution (JONES and ALLEN), A., ii, 467.
 decolorisation of (HERZIG and MEYER), A., i, 237.
 dimethyl ether of (GRANDE), A., i, 563.
 dibenzoyl derivative of (BISTRZYKI and NENCKI), A., i, 237.
- Phenolphthalein, diamino-, dimethyl ether of (ERRERA and BERTÈ), A., i, 564.
 dibromodiamino-, and its hydrochloride (ERRERA and BERTÈ), A., i, 564.
 dibromodinitro-, and its diacetyl derivative (ERRERA and BERTÈ), A., i, 564.
 dinitro-, and its mono- and dimethyl ethers (ERRERA and BERTÈ), A., i, 564.
- Phenols, freezing points of solutions of, in hydrocarbons (PATERNÒ), A., ii, 156.
 and their derivatives, freezing points of solutions of, in naphthalene (AUWERS), A., ii, 156; (AUWERS and INNES), A., ii, 293.
 action of magnesium on solutions of (VITALI), A., ii, 420.
- Phenols, thio-, action of bromo-derivatives of aromatic hydrocarbons on lead salts of (BOURGEOIS), A., i, 17.
- Phenols. See also:—
 Anhydroglycopyrogallol.
 Anthraflavic acid.
iso-Anthraflavic acid.
 Anthranol.
 Benzoylmethylresorcinol.
 Benzylideneanhydroglyeogallol.
 Carvacrol.
 Catechol.
 Cresol and *iso*-Cresol.
o-, *m*-, and *p*-Cresols.
p-Cymoquinol.
 Diamyloxyquinol.

- Phenols. See:—
 Dianthranol.
 Diazophenol hydrosulphide.
 Dibenzylxyquinol.
 Dihydroreorcinol.
 Dihydroxyacetophenone.
 1 : 2-Dihydroxyphenyl-*p*-phenylsulphone.
 1 : 4-Dihydroxyphenylsulphone.
o-Dimethoxybenzene.
 Dimethylapionol.
 Dimethylnaphthol.
 Dimethylnaphthol, oxy-.
 Dimethylcyclopentanol.
 Diphenylhydroxyacetophenone.
 Diphenylsulphone-*o*-aminophenol.
 Duroquinol.
p-Ethyl cresol.
 Eugenol and *iso*-Eugenol.
 Euxanthone.
 Guaiaecol.
 Hexahydroxybenzene.
 Homopyrocatechol.
o-Hydroxybenzophenone (benzoylphenol).
 Hydroxyhexahydrotoluene.
 Indophenol.
 Menthol.
γ-Methoxy-1 : 3 : 4-xyleneol.
 3 : 5-Methylisobutylphenol.
 -Methylcyclohexanol.
 Methylcyclohexenol.
 3 : 5-Methyl-5-hexylphenol.
 α -Naphthol and β -naphthol.
 Orcinol.
 Phenol.
 Phenyl dihydrocarbostyryl.
 Phloroglucinol.
 Pinol ?
m-Propylphenol and *iso*-propylphenol.
iso-Propylquinol.
 Pyrogallol.
 Pyrocatechol (catechol).
 Pyrogallol.
 Quinonedinaphthylhemiacetal.
 Resorcinol.
 Saligenin.
 Sobrerol.
 Thymol.
 Thymoquinonequinolhemiacetal.
 Trihydroxyphenylsulphone.
 Triresoreinol.
 Veratrole.
 1 : 3 : 4-Xyleneol.
 Phenomalic acid. See Acetylacrylic acid.
 Phenosafranin (FISCHER and HEPP), A., i, 50.
 Phenoxazonecarboxylic acid, amino-, and its salts (DIEPOLDER), A., i, 615.
o-Phenoxybenzoic acid, calcium salt, distillation of (JEITELES), A., i, 434.
p-Phenoxybenzoic acid, *p*-amino-, and its salts (HÄUSSERMANN and BAUER), A., i, 676.
p-nitro-, and its salts (HÄUSSERMANN and BAUER), A., i, 676.
 4' : 1'-Phenoxybenzylphthalazone (BROMBERG), A., i, 579.
 α -Phenoxybutyramide (LUCHMANN), A., i, 544.
 α -Phenoxybutyric acid and its ethylic and metallic salts (LUCHMANN), A., i, 544.
 α -Phenoxybutyric chloride (LUCHMANN), A., i, 544.
 γ -Phenoxybutyric acid (γ -phenoxyethylacetic acid) (BENTLEY, HAWORTH, and PERKIN), T., 168; P., 1896, 35.
 action of hydrobromic acid on (BENTLEY, HAWORTH, and PERKIN), T., 168; P., 1896, 36.
 α -Phenoxybutyronitrile (LUCHMANN), A., i, 544.
 α -Phenoxybutyrosulfonamide (LUCHMANN), A., i, 544.
 γ -Phenoxyethylacetic acid. See γ -Phenoxybutyric acid.
 Phenoxyethyl alcohol. See Glycol monophenyl ether.
 Phenoxyethyl bromide, action of ethylic sodiodimethylpropanetricarboxylate on (PERKIN), T., 1500; P., 1896, 170.
 action of ethylic sodioisopropylpropanetricarboxylate on (PERKIN), T., 1504; P., 1896, 170.
 Phenoxyethyl ethylic ether (PERKIN), T., 1501, 1503.
 γ -Phenoxyethylmalonic acid (BENTLEY, HAWORTH, and PERKIN), T., 167; P., 1896, 35.
 action of heat on (BENTLEY, HAWORTH, and PERKIN), T., 168; P., 1896, 35.
 γ -Phenoxyethyl- α -methylacetic acid. See Phenoxyvaleric acid.
 γ -Phenoxyethyl- α -methylacetoacetic acid, ethylic salt, and its hydrolysis (BENTLEY, HAWORTH, and PERKIN), T., 173.
 γ -Phenoxyethyl- α -methylmalonic acid (BENTLEY, HAWORTH, and PERKIN), T., 171; P., 1896, 36.
 action of heat on (BENTLEY, HAWORTH, and PERKIN), T., 172; P., 1896, 36.
 ethylic salt (BENTLEY, HAWORTH, and PERKIN), T., 171; P., 1896, 36.
 α -Phenoxyisooctane- $\gamma\gamma\delta$ -tricarboxylic

- acid (*phenoxyethylisopropylpropanetricarboxylic acid*), and the action of heat on it (PERKIN), T., 1504, 1505.
- Phenoxyethylisopropylglutaric acid (PERKIN), T., 1505.
- Phenoxyethylisopropylpropanetricarboxylic acid. See α -Phenoxyisooctane- $\gamma\delta$ -tricarboxylic acid.
- 1- γ -Phenoxypropylpiperidine and its salts (GABRIEL and STELZNER), A., i, 703.
- 1' : 3'-Phenoxypropylisoquinoline and its salts (ALBAHARY), A., i, 699.
- Phenoxyvaleric acid: δ -phenoxy- α -methylbutyric acid (*γ -phenoxyethyl- α -methylacetic acid*) (BENTLEY, HAWORTH, and PERKIN), T., 172, 173; P., 1896, 36.
- action of mineral acids on (BENTLEY, HAWORTH, and PERKIN), T., 173; P., 1896, 36.
- Phenyl *o*-acetoxystyrylketone dibromide (BABLICH and KOSTANECKI), A., i, 239.
- Phenyl *m*-acetoxystyryl ketone (BABLICH and KOSTANECKI), A., i, 239.
- Phenyl *p*-acetoxystyryl ketone (BABLICH and KOSTANECKI), A., i, 239.
- Phenyl allyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1141, 1225, 1247.
- Phenyl benzyl ketone (*deoxybenzoin*) (CURTIUS), A., i, 339.
- sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- Phenyl 2:5-bromohydroxystyryl ketone and its sodium salt, acetyl derivatives, and dibromide (KOSTANECKI and OPPELT), A., i, 241.
- Phenyl 5-bromo-2-hydroxystyryl ketone (*2-hydroxybenzylideneacetophenone, 5-bromo-*) (KOSTANECKI and SCHNEIDER), A., i, 614.
- Phenyl isobutyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1186, 1240.
- Phenyl α -coumaryl ketone (KOSTANECKI), A., i, 240.
- o*-bromo- (KOSTANECKI and OPPELT), A., i, 241.
- Phenyl cymyl ketone (*cymophenone*), preparation of (BOUVEAULT), A., i, 616.
- Phenyl 2:4-diethoxystyryl ketone (*2:4-diethoxybenzylideneacetophenone*) (KESSELKAUL and KOSTANECKI), A., i, 607.
- Phenyl *m*-ethoxystyryl ketone (*3-ethoxybenzylideneacetophenone*) (KOSTANECKI and OPPELT), A., i, 241; (KOSTANECKI and SCHNEIDER), A., i, 614.
- Phenyl *p*-ethoxystyryl ketone (*4-ethoxybenzylideneacetophenone*) (KOSTANECKI and SCHNEIDER), A., i, 614.
- Phenyl ethyl ketone, magnetic rotatory power, &c., of (PERKIN), T., 1091, 1093, 1201, 1243.
- Phenyl *o*-hydroxystyryl ketone, preparation of, and its benzoyl derivative (HARRIES and BUSSE), A., i, 302.
- and its sodium salt and acetyl derivative (BABLICH and KOSTANECKI), A., i, 239.
- phenylhydrazone (HARRIES and BUSSE), A., i, 302.
- Phenyl *o*-hydroxystyryl ketone, tetrabromo- (HARRIES and BUSSE), A., i, 302.
- Phenyl *m*-hydroxystyryl ketone and its dibromide and acetyl derivatives (BABLICH and v. KOSTANECKI), A., i, 239.
- Phenyl *p*-hydroxystyryl ketone and its dibromide and acetyl derivatives (BABLICH and v. KOSTANECKI), A., i, 239.
- Phenyl octyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1186, 1240.
- Phenyl propyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1186, 1240.
- Phenyl *iso*-propyl oxide, magnetic rotatory power, &c., of (PERKIN), T., 1080, 1081, 1186, 1240.
- Phenyl styryl ketone (v. KOSTANECKI and ROSSBACH), A., i, 556.
- $\alpha\beta$ -dichloride (GOLDSCHMIDT), A., i, 189.
- condensation of, with acetophenone (v. KOSTANECKI and TAMBOR), A., i, 557.
- Phenyl styryl ketone, *o*-amino-, and its acetyl derivative and bromo-derivative (ENGLER and DORANT), A., i, 49.
- hydrazone of (ENGLER and DORANT), A., i, 49.
- o*-nitro-, and its hydrazone (ENGLER and DORANT), A., i, 49.
- Phenyl *p*-tolyl ketone, *m*-amino-: its salts and acetyl derivative (LIMPRICHT and LENZ), A., i, 41.
- p*-amino-, diamino-, triamino- (LIMPRICHT and SAMIETZ), A., i, 42.
- bromo- (LIMPRICHT and SAMIETZ), A., i, 42.
- bromonitro- (LIMPRICHT and LENZ), A., i, 40.

- Phenyl *p*-tolyl ketone, chloronitro- (LIMPRICHT and LENZ), A., i, 40.
m-nitro-, and its dichloride (LIMPRICHT and LENZ), A., i, 40.
p-nitro- (LIMPRICHT and SAMIETZ), A., i, 42.
*d*initro- (LIMPRICHT and LENZ), A., i, 41; (LIMPRICHT and SAMIETZ), A., i, 42.
*tr*initro- (LIMPRICHT and LENZ), A., i, 41; (LIMPRICHT and SAMIETZ), A., i, 42.
- Phenyl *p*-tolyl ketone-phenylhydrazone, *p*-amino- (LIMPRICHT and SAMIETZ), A., i, 42.
p-nitro- (LIMPRICHT and SAMIETZ), A., i, 42.
- Phenyl tolyl ketones, preparation of (COMSTOCK), A., i, 613.
- Phenyl *p*-tolyl ketone-sulphonic acid (LIMPRICHT and LENZ), A., i, 41.
m-nitro- (LIMPRICHT and LENZ), A., i, 40.
- Phenyl *p*-tolyl ketoxime, *m*-amino- (LIMPRICHT and LENZ), A., i, 41.
p-nitro- (LIMPRICHT and SAMIETZ), A., i, 42.
*d*initro- (LIMPRICHT and LENZ), A., i, 41.
- Phenyl *p*-tolyl phenylene diketone, *m*-nitro- (LIMPRICHT and LENZ), A., i, 41.
p-nitro- (LIMPRICHT and SAMIETZ), A., i, 42.
- Phenyl *o*-xylyl ketone, *m*-amino-, and salts (LIMPRICHT and FALKENBERG), A., i, 43.
m-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenyl *m*-xylyl ketone, *m*-amino-, and salts (LIMPRICHT and FALKENBERG), A., i, 43.
azoxy- (LIMPRICHT and FALKENBERG), A., i, 43.
m-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
*tr*initro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenyl *p*-xylyl ketone, *m*-amino-, and salts (LIMPRICHT and FALKENBERG), A., i, 43.
m-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenyl *m*-xylyl ketone-sulphonic acid, *m*-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenyl *m*-xylyl ketoxime, *m*-nitro- (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenylacetamide, from phenacetylthio-carbimide and ammonia (DIXON), T., 863.
- Phenylacetamide, magnetic rotatory power, &c., of (PERKIN), T., 1114, 1216, 1246.
- ψ -Phenylacetamide (BUCHNER), A., i, 230.
- Phenylacetic acid (*α -toluic acid*), magnetic rotatory power and relative density of (PERKIN), T., 1079, 1094, 1175, 1238.
heat of combustion of (STOHMANN and SCHMIDT), A., ii, 469.
catalytic action of pierie acid on, the rate of etherification of (GOLDSCHMIDT), A., ii, 638.
action of phosphorus pentachloride on (DIXON), T., 865.
ethylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1077, 1175, 1238.
- Phenylacetic acid, 2 : 4 : 6-*tr*initro- (JACKSON and PHINNEY), A., i, 234.
- Phenylacetic chloride (DIXON), T., 865; P., 1896, 100.
magnetic rotatory power, &c., of (PERKIN), T., 1122, 1205, 1244.
action of lead thiocyanate on (DIXON), T., 865; P., 1896, 100.
condensation of, with ethylic sodio-malonate (SCHOTT), A., i, 700.
- Phenylacetic peroxide (VANINO and THIELE), A., i, 597.
- ψ -Phenylacetic acid, sodium salt of (BUCHNER), A., i, 230.
tribromide of (BUCHNER), A., i, 230.
- Phenylacetone. See Benzyl methyl ketone.
- Phenylacetoneitrile (*α -toluonitrile*, *benzylic cyanide*), occurrence of (HOFMANN LECTURE), T., 719.
magnetic rotatory power, &c., of (PERKIN), T., 1097, 1206, 1244.
- Phenylacetonylsemicarbazide (CURTIUS and HOFMANN), A., i, 648.
- Phenylacetoxime. See Benzyl methyl ketone, oxime of.
- Phenylacetylsemicarbazide (CURTIUS and HOFMANN), A., i, 648.
- n*-Phenylacetyl-*r*-phenylbenzylthiourea (DIXON), T., 868; P., 1896, 101.
- ab*-Phenylacetylphenylthiocarbamide, and the action of silver nitrate on (DIXON), T., 866; P., 1896, 101.
- ab*-Phenylacetylphenylurea (DIXON), T., 866; P., 1896, 101.
- Phenylacetylthiocarbimide, and the action of ammonia, aniline, benzyl-aniline, and *o*- and *p*-toluidine on

- (DIXON), T. 865—868; P., 1896, 101.
- Phenylacetylthiocarbimide, action of water on (DIXON), T., 865.
- ab*-Phenylacetyl-*o*-tolylthiocarbamide, and the action of silver nitrate on (DIXON), T., 866, 867; P., 1896, 101.
- ab*-Phenylacetyl-*p*-tolylthiocarbamide, and the action of silver nitrate on (DIXON), T., 867; P., 1896, 101.
- Phenylacetyl-*o*-tolylurea (DIXON), T., 867; P., 1896, 101.
- ab*-Phenylacetyl-*p*-tolylurea (DIXON), T., 868; P., 1896, 101.
- Phenylacetylene, action of water on (DESGREZ), A., i, 2.
- Phenylacridine, diamino-. See Chrys-aniline.
- β -Phenylacrylic acid See Cinnamic acid.
- Phenylallylthiocarbamide, action of bromine on (DIXON), T., 852; P., 1896, 99.
- Phenylaminoacetohydrazide (RADEN-HAUSEN), A., i, 138.
- Phenylamine. See Aniline.
- Phenylamino-. See Anilino-.
- Phenyl-4-amino-1 : 2-azimidobenzene : its platinochloride and acetyl derivative (NIETZKI and ALMENRÄDER), A., i, 164.
- Phenyl-*o*-aminobenzylhydrazine, *o*-amino-, condensation of, with formaldehyde (BUSCH), A., i, 508.
- p*-bromo-, and its oxalate (BUSCH and HEINEN), A., i, 159.
- p*-chloro- (BUSCH and VOLKENING), A., i, 159.
- Phenyl-*o*-aminobenzylidenhydrazone (WALTHER), A., i, 543.
- Phenyl-*m*-aminobenzylidenhydrazone (WALTHER), A., i, 543.
- Phenyl-*p*-aminobenzylidenhydrazone (WALTHER), A., i, 543.
- α -Phenyl-*o*-aminocinnamic acid and its salts (PSCHORR), A., i, 303.
- α -Phenyl-*o*-amino- β -phenylpropionic acid (PSCHORR), A., i, 303.
- Phenyl-*p*-aminotolylsulphone and its acetyl derivative (HINSBERG and HIMMELSCHEN), A., i, 685.
- Phenyl-1 : 2-azimidobenzene, 4-amino-, and its acetyl derivative (NIETZKI and BAUR), A., i, 165.
- 4-nitro- (NIETZKI and BAUR), A., i, 165.
- Phenylazocarbonanilide (BUSCH and BECKER), A., i, 581.
- Phenylazocarboxylamide and its potassium derivative (THIELE), A., i, 94.
- Phenylazocarboxylic acid, potassium salt (THIELE), A., i, 94.
- Phenylazimidide (CURTIUS), A., i, 340.
- magnetic rotatory power, &c., of (PERKIN), T., 1098, 1154, 1209, 1232, 1245.
- reduction of (CURTIUS), A., i, 35.
- Phenylbenzoic acid. See Diphenyl-carboxylic acid.
- Phenylbenzoin, ethylic ether of (BILTZ), A., i, 690.
- Phenylbenzoylbenzylene (CURTIUS), A., i, 339.
- Phenylbenzoylsemicarbazide (CURTIUS and HOFMANN), A., i, 647.
- m*-nitro- (CURTIUS and HOFMANN), A., i, 648.
- Phenylbenzylcarboxyethylthiourea (DORAN), T., 332; P., 1896, 75.
- Phenylbenzylethylamine and its hydriodide, hydrochloride, and sulphate (FISCHER), A., i, 262.
- Phenylbenzylhydroxyethylamine and its hydrochloride and nitramine (FISCHER), A., i, 262.
- Phenylbenzylidenhydrazone, benzoyl derivative (WALTHER), A., i, 543.
- p*-nitro-, and its acetyl and benzoyl derivatives (WALTHER), A., i, 542.
- Phenylbenzylidenemethylhydrazine (GOLDSTEIN), A., i, 436.
- behaviour of, towards *p*-nitroisodiazo-benzene hydroxide (BAMBERGER), A., i, 540.
- 1 : 3 : 5-Phenylbenzylpyrazolone-4-carboxylic acid, ethylic salt of (SCHOTT), A., i, 700.
- Phenylbromacetic acid, rotatory power of (WALDEN), A., ii, 138.
- ethylic salt of, action of finely divided silver on (HELL and WEINZWEIG), A., i, 45.
- methylic, ethylic, and isobutylic salts, rotatory power of (WALDEN), A., ii, 138.
- Phenylbromacetic bromide, rotatory power of (WALDEN), A., ii, 138.
- Phenylbromomalonic acid, bromodinitro-, ethylic salt of (JACKSON and SOCH), A., i, 371.
- trinitro-, ethylic salt of (JACKSON and SOCH), A., i, 371.
- Phenylbutylene (*iso-butenylbenzene*), magnetic rotatory power, &c., of (PERKIN), T., 1143, 1224, 1229, 1246.
- n*-Phenylbutylene- ψ -thiocarbamide and its pierate (LUCHMANN), A., i, 545.
- Phenylisobutylidenhydrazine, behaviour of, towards alcoholic zinc chloride (BRUNNER), A., i, 169.

- Phenylbutyric acid (FITTIG, WOLFF, and SHIELDS), A., i, 170.
- Phenylcarbamazoimide (CURTIUS and HOFMANN), A., i, 648.
- Phenylcarbamine, preparation of (COHEN and ARCHDEACON), T., 92 ; (HOFMANN LECTURE), T., 652.
- Phenylcarbamide, *o*-cyano- (PINNOW and SÄMANN), A., i, 366.
- Phenylcarbimide (*phenylic isocyanate*), discovery of (HOFMANN LECTURE), T., 653.
- preparation of (HOFMANN LECTURE), T., 710, 714.
- properties of (HOFMANN LECTURE), T., 654.
- Phenylcarboxyethylsemithiocarbazide (DORAN), T., 333 ; P., 1896, 75.
- αβ*-Phenylcarboxyethylthiocarbamide (DORAN), T., 326 ; P., 1896, 74.
- Phenylcarboxyethylthiourea, probable non-existence of (DORAN), T., 341, 344 ; P., 1896, 75.
- Phenylchloroacetic acid, rotatory power of (WALDEN), A., ii, 138.
- methylic, ethylic, propylic, and amylic salts, rotatory power of (WALDEN), A., ii, 138.
- Phenylchloroacetic acid, dextro- and inactive, rotatory powers of the lævo- and inactive amylic salts of (WALDEN), A., ii, 139.
- Phenylchloroacetic chloride, rotatory power of (WALDEN), A., ii, 138.
- Phenylchloramine, supposed formation of (LÖB), A., i, 605.
- Phenyl-*β*-chloroethylcarbamide (GABRIEL and STELZNER), A., i, 122.
- 2 : 6-Phenylchloropyridine and its aurochloride (LEBEN), A., i, 574.
- Phenylcoumalin and its picric acid and salicylic acid derivatives (LEBEN), A., i, 574.
- melting point of (HESSE), A., i, 60.
- Phenylcoumalindianiline (LEBEN), A., i, 575.
- o*-Phenylcoumaroketone. See Phenyl *o*-hydroxystyryl ketone.
- Phenylisocrotyl (?) thiocarbamide (LUCHMANN), A., i, 546.
- Phenyldiazosulphonie acid, *p*-nitro-, potassium salt (BAMBERGER and KRAUS), A., i, 610.
- Phenyl-*p*-diazotolylsulphone (HINSBERG and HIMMELSCHNEID), A., i, 685.
- 5-Phenyl-2 : 6-dibenzyl-*m*-diazine, 4-amino-, and its condensation with acetic chloride (HERFELDT), A., i, 393.
- bromo-4-amino- (HERFELDT), A., i, 393.
- chloro-4-amino-, and its hydrochloride, methiodide, and methyl derivative (HERFELDT), A., i, 393.
- Phenyldiethylhydrazine, formyl derivative (FREER and SHERMAN), A., i, 612.
- Phenyldihydrocoumaralcohol. See Phenyl-*o*-hydroxybenzylcarbinol.
- Phenyldihydrofurfurantricarboxylic acid, triethylic salt, action of ammonia and of potassium hydroxide on (RUHEMANN and WOLFF), T., 1384 ; P., 1896, 166.
- 3'-Phenyldihydro-*β*-phenotriazine, *p*-bromo-, and its salts (BUSCH and HEINEN), A., i, 159.
- m*-chloro- (BUSCH and FRANCIS), A., i, 158.
- p*-chloro-, and its salts (BUSCH and VOLKENING), A., i, 158.
- β*-Phenyldihydrocarbostyryl (PSCHORR), A., i, 303.
- 4'-Phenyldihydroquinazoline and its hydrochloride, pierate, and nitroso-derivatives (GABRIEL and STELZNER), A., i, 507.
- 2'-bromo-, hydrobromide of (GABRIEL and STELZNER), A., i, 506.
- Phenyldimethylamine, preparation of (HOFMANN LECTURE), T., 670.
- Phenyldimethylcoumalinquinol (LEBEN), A., i, 574.
- Phenyldimethylpyrazolone. See Antipyrine.
- Phenyldithienylmethane, *o*-, *m*-, and *p*-nitro- (TÖHL and NÄHKE), A., i, 690.
- 5-Phenyl-3 : 4-dithiobiazolone, 2-amino-phenyl sulphide and its salts (BUSCH), A., i, 706.
- 2-aminotolyl sulphide (BUSCH), A., i, 706.
- 2-ethylaminophenyl sulphide and its salts (BUSCH), A., i, 707.
- aniline and tripropylamine derivative of (BUSCH), A., i, 706.
- 2-hydrosulphide, diethylamine and trimethylamine derivatives of (BUSCH), A., i, 706.
- 2-phenyl sulphide (BUSCH), A., i, 706.
- 2-tetrasulphide (BUSCH), A., i, 705.
- 5-Phenyl-3 : 4-dithiobiazolone-2-benzylidenesulphime (BUSCH), A., i, 705.
- 5-Phenyl-3 : 4-dithiobiazolone-2-cinnamylidenesulphime (BUSCH), A., i, 706.
- 5-Phenyl-3 : 4-dithiobiazolone-2-dimethylhydrosulphamine (BUSCH), A., i, 706.
- 5-Phenyl-3 : 4-dithiobiazolone-2-hydrosulphamine (BUSCH), A., i, 705.

- 5-Phenyl-3 : 4-dithiobiazolone-2-ethylhydrosulphamine (BUSCH), A., i, 706.
- 5-Phenyl-3 : 4-dithiobiazolone-2-methylhydrosulphamine (BUSCH), A., i, 706.
- Phenylisodithiobiazolone (BUSCH), A., i, 190.
- Phenyldi-*o*-tolylguanidine: its hydrochloride, nitrate, and platinochloride, and behaviour towards carbon bisulphide (MARCKWALD), A., i, 30.
- Phenyleneaceticpropionic acid and its salts (EINHORN and LUMSDEN), A., i, 45.
- nitro-, and its salts (EINHORN and LUMSDEN), A., i, 46.
- p*-Phenylenecarbamide (CURTIUS and DAVIDIS), A., i, 681.
- o*-Phenylenediamine, preparation of (HINSBERG and KÖNIG), A., i, 165.
- magnetic rotatory power, &c., of (PERKIN), T., 1104, 1109, 1131, 1214, 1245.
- hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1112, 1132, 1223, 1246.
- condensation of, with acetylsatin (SCHÜNCK and MARCHLEWSKI), A., i, 235.
- condensation of, with dihydroxytoluquinone (KEHRMANN and FÜHNER), A., i, 512.
- condensation of, with isatin and with *m*-chlorisatin (SCHÜNCKE and MARCHLEWSKI), A., i, 96.
- m*-Phenylenediamine, discovery of (HOFMANN LECTURE), T., 688.
- magnetic rotatory power, &c., of (PERKIN), T., 1109, 1131, 1155, 1214, 1232, 1245.
- hydrochloride, magnetic rotatory power, &c., of (PERKIN), T., 1112, 1132, 1223, 1246.
- m*-Phenylenediamine, bromo-, and its hydrobromide (JACKSON and CALVERT), A., i, 538.
- dibromo-, and its salts and acetyl derivative (JACKSON and CALVERT), A., i, 538.
- tribromo-: its hydrochloride and diacetyl derivative (JACKSON and CALVERT), A., i, 538.
- tetrabromo- (JACKSON and CALVERT), A., i, 539.
- p*-Phenylenediamine, preparation of (HOFMANN LECTURE), T., 689.
- hydrochloride, magnetic rotatory powers, &c., of (PERKIN), T., 1112, 1132, 1223, 1246.
- p*-Phenylenedimethyldiamine, magnetic rotatory power, &c., of (PERKIN), T., 1109, 1215, 1246.
- Phenylenediurethane, tribromo- (JACKSON and CALVERT), A., i, 538.
- Phenylene-ethylenediamine (HINSBERG and STRÜPLER), A., i, 47.
- dinitroso- (HINSBERG and STRÜPLER), A., i, 48.
- m*-Phenylene-ethylurethane (CURTIUS and DAVIDIS), A., i, 681.
- p*-Phenylene-ethylurethane (CURTIUS and DAVIDIS), A., i, 681.
- Phenylenemethyldiamine. See Methylaniline, amino-.
- Phenylethanetricarboxylic acid, ethylic salt, velocity of hydrolysis of (HJELT), A., i, 600.
- o*-Phenyl- γ -ethoxybutylthiocarbamide (LICHMANN), A., i, 545.
- Phenyl-6-ethoxy-1 : 3 : 4-tolylenediamine: its hydrochloride, azimide, thiocarbonyl compound, stilbazonium base, and methenyl derivative, with its nitrate and hydrochloride (JACOBSEN, FERTSCH, MARSDEN, and SCHKOLNIK), A., i, 24.
- Phenylethyleneamine. See Diphenyldiethylenediamine.
- Phenylethylenecarbamide (GABRIEL and STELZNER), A., i, 122.
- n*-Phenylethylene- ψ -carbamide (GABRIEL and STELZNER), A., i, 122.
- Phenylethylenediamine: its acetyl derivative, thiocarbamate, and its condensation with benzile (FEIST and ARNSTEIN), A., i, 258.
- diacetyl and dibenzoyl compounds of (FEIST and ARNSTEIN), A., i, 259.
- Phenylethylenethiocarbamide (FEIST and ARNSTEIN), A., i, 258.
- n*-Phenylethylene- ψ -thiocarbamide (GABRIEL and STELZNER), A., i, 122.
- Phenylethyl nitromethane, labile form of (KONOWALOFF), A., i, 676.
- $\mu\beta$ -Phenylethyloxazoline (BOOKMAN), A., i, 200.
- Phenylfluorinesulphone (HINSBERG and POLLAK), A., i, 394.
- Phenylfluorindine, preparation of (FISCHER and HEPP), A., i, 324, 539.
- hydrochloride (FISCHER and HEPP), A., i, 324.
- Phenylglycinyphenylsemicarbazide (WIDMAN), A., i, 629.
- Phenylglycollic acid. See Mandelic acid.
- Phenylglyoxylbenzamide (FISCHER), A., i, 262.
- Phenylglyoxyethoxybenzylamine (MINOVICI), A., i, 705.
- Phenylglyoxymethoxybenzamide. See Methoxybenzoic acid, phenylglyoxylamide of.

- Phenylglyoxylmethoxybenzylamine (MINOVICI), A., i, 705.
- Phenylhexahydroresorcinol. See 1 : 3 : 5-Dihydroxyphenylcyclohexane.
- β -Phenylhydracrylic acid, α -iodo- (ERLENMEYER), A., i, 302.
- Phenylhydrazine, magnetic rotatory power, &c., of (PERKIN), T., 1104, 1209, 1245.
- oxidation of (WALTER), A., i, 472.
- reduction by means of (WALTHER), A., i, 542.
- action of sulphur nitride on (SCHENCK), A., i, 427.
- behaviour of, towards chloracetamide and phenylhydrazinoacetamide (RUPE and HEBERLEIN), A., i, 363.
- Phenylhydrazine, hydriodide, hydrofluoride, and double salts of (GRIMALDI), A., i, 220.
- citrate and *d*-tartrate of (DE VRIES), A., i, 94.
- hydrogen tartrate aldehydates (CAUSSE), A., i, 611.
- salts of (CAUSSE), A., i, 479.
- benzoyl and sodiodibenzoyl derivatives (FREER and SHERMAN), A., i, 612.
- formyl, sodioformyl, β -formyl- α -ethyl, and α -formyl- β -ethyl derivatives (FREER and SHERMAN), A., i, 611.
- β -lactyl derivative of (DE VRIES), A., i, 94.
- Phenylhydrazine, estimation of (DENIGES), A., ii, 387.
- Phenylhydrazine, dicyano- (ANDRE-OCCHI), A., i, 221.
- p*-nitro-, from diazobenzenemercaptan hydrosulphide (BAMBERGER and KRAUS), A., i, 219.
- from *iso-p*-nitrodiazobenzene hydroxide (BAMBERGER and KRAUS), A., i, 220.
- hydrochloride (BAMBERGER and KRAUS), A., i, 610.
- 2 : 4-dinitro- (CURTIUS), A., i, 339.
- Phenylhydrazinedisulphonic acid, *p*-nitro-, dipotassium and tripotassium salts (BAMBERGER and KRAUS), A., i, 610.
- Phenylhydrazinoacetamide, asymmetric, benzylidene compound (RUPE and HEBERLEIN), A., i, 363.
- Phenylhydrazinoacetanilide, asymmetric, behaviour of, towards sulphuric acid (RUPE and HEBERLEIN), A., i, 363.
- Phenylhydrazinoacetophenylhydrazide, asymmetric, benzylidene compound (RUPE and HEBERLEIN), A., i, 363.
- Phenylhydrazinoformic acid, ethylic salt, and its benzylidene derivative (RUPE), A., i, 429.
- as*- β -Phenylhydrazinopropionic acid, ethylic salt of, and its picrate, oxalate, semicarbazide, and phenylthiosemicarbazide (HARRIES and LOTH), A., i, 321.
- Phenylhydrazonemesoxalonitrile (SCHMIDTMANN), A., i, 459.
- Phenylhydrazonemethanedisulphonic acid, potassium salt (VON PECHMANN), A., i, 679.
- Phenyl-*o*-hydroxybenzylcarbinol (HARRIES and BUSSE), A., i, 302.
- Phenylhydroxyethylamine, three isomerides (ERLENMEYER), A., i, 305.
- Phenylhydroxylamine, behaviour of, towards phenylhydrazine (WALTHER), A., i, 542.
- nitroso- (ANGELI), A., i, 613.
- β -Phenylhydroxylamine, preparation of (WISLICENUS), A., i, 672.
- Phenylhydroxylaminoacetic acid (TRAUBE), A., i, 9.
- Phenylhydroxyloxamide and its acetyl derivative (SCHIFF and MONSACCHI), A., i, 209.
- Phenylic alcohol. See Phenol.
- bisulphide, from *anti-p*-chlorodiazobenzenethiophenyl ether (HANTZSCH and FREESE), A., i, 217.
- p*-dinitro-, from *di-p*-nitrodiazobenzene sulphide and benzene (BAMBERGER and KRAUS), A., i, 219.
- β -bromethylic ether (BENTLEY, HAWORTH, and PERKIN), T., 165, 166.
- γ -bromopropylic ether (SOLONINA), A., i, 476.
- chloride, *isocyno*-, discovery of (HOFMANN LECTURE), T, 712.
- β -chloroethylic ether (BENTLEY, HAWORTH, and PERKIN), T., 165.
- isocyanate*. See Phenylcarbinide.
- ether, preparation of (JEITELES), A., i, 435.
- o*-amino-, preparation of, and its hydrochloride (ULLMANN), A., i, 605.
- p*-amino-, and its acetyl derivative (HAEUSSERMANN and TEICHMANN), A., i, 533.
- 2 : 4'-diamino-, and its dihydrochloride (HAEUSSERMANN and BAUER), A., i, 676.
- 4 : 4'-diamino-, and its hydrochloride (HAEUSSERMANN and TEICHMANN), A., i, 533.
- o*-nitro- (HAEUSSERMANN and TEICHMANN), A., i, 533.

- Phenylic ether, *p*-nitro- (HAEUSSERMANN and TEICHMANN), A., i, 533.
- 2 : 2'-dinitro- (HAEUSSERMANN and BAUER), A., i, 676.
- 2 : 4'-dinitro- (HAEUSSERMANN and TEICHMANN), A., i, 534; (HAEUSSERMANN and BAUER), A., i, 676.
- 4 : 4'-dinitro- (HAEUSSERMANN and TEICHMANN), A., i, 533.
- β -ethoxyethyl ether (BENTLEY, HAWORTH, and PERKIN), T., 171.
- ethyl ether, 3 : 5-dibromo-, preparation of (JACKSON and CALVERT), A., i, 473.
- hydrate. See Phenol.
- iodochloride, action of zinc ethyl on (LACHMANN), A., i, 460.
- mercaptan (*thiophenol*) (VOSWINKEL), A., i, 378.
- condensation of, with benzil and with quinone (TROEGER and EGGERT), A., i, 562.
- o*-amino-, preparation of (HOFMANN LECTURE), T., 712, 713.
- compound obtained from, by action of cyanogen (HOFMANN LECTURE), T., 713.
- mesitylic sulphide (BOURGEOIS), A., i, 18.
- selenide, synthesis of (KRAFFT and KASCHAU), A., i, 296.
- sulphide, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1124, 1204, 1243.
- p*-chloro-, from *anti-p*-chlorodiazoberzenethiophenyl ether (HANTZSCH and FREESE), A., i, 217.
- m*-tolyl sulphide (BOURGEOIS), A., i, 17.
- p*-tolyl sulphide (BOURGEOIS), A., i, 17.
- o*-xylylic sulphide [$\text{Me}_2 : \text{S} = 1 : 2 : 4$] (BOURGEOIS), A., i, 17.
- m*-xylylic sulphide [$\text{Me}_2 : \text{S} = 1 : 3 : 4$] (BOURGEOIS), A., i, 17.
- p*-xylylic sulphide (BOURGEOIS), A., i, 18.
- Phenylimido- β -butyric acid, *o*-amino-, ethylic and methylic salts of (HINSBERG and KOLLER), A., i, 537.
- 2'-Phenylindazole, *m*-chloro- (BUSCH and FRANCIS), A., i, 158.
- 3'-Phenylindazole and its increuric and silver derivatives and salts (AUWERS and SONDHEIMER), A., i, 505.
- 2'-acetyl derivative and nitroso-derivative (AUWERS and SONDHEIMER), A., i, 505.
- 3'-Phenylisindazole, 1'-acetyl derivative of, and its acetate (AUWERS and EWING), A., i, 504.
- Phenylindoxazine, action of fuming hydriodic acid on (COHN), A., i, 440.
- Phenylinduline, constitution of (FISCHER and HEPP), A., i, 51.
- amino-, and its hydrochloride, nitrate, and diazo-derivative (FISCHER and HEPP), A., i, 324.
- 4'-Phenyl-2'-ketodihydroquinazoline. See 4'-Phenylquinazoline.
- 3'-Phenylketotetrahydroquinazoline, *p*-bromo- (BUSCH and HEINEN), A., i, 159.
- o*-chloro- (BUSCH and BRUNNER), A., i, 157.
- Phenylmalonic acid, ethylic salt, rate of hydrolysis of (HJELT), A., i, 598.
- tr*initro-, ethylic salt, and its sodium derivative (JACKSON and SOCH), A., i, 570.
- β -Phenyl- μ -methoxyphenyloxazole and its salts (MINOVICI), A., i, 703.
- μ -Phenyl- β -methoxyphenyloxazole and its salts (MINOVICI), A., i, 704.
- Phenylmethylaminobenzenylmethylimidine : its hydriodide and picrate (VON PECHMANN), A., i, 32.
- μ -Phenylmethylaminopentthiazoline, γ -bromo-, and hydrobromide of (DIXON), T., 29; P., 1895, 217.
- Phenylmethylisoamylcarbamide (STOERMER and VON LEPEL), A., i, 664.
- Phenylmethylisoamylthiocarbamide (STOERMER and VON LEPEL), A., i, 664.
- Phenylmethylisobutylcarbamide (STOERMER and VON LEPEL), A., i, 662.
- Phenylmethylisobutylidenehydrazine (BRUNNER), A., i, 625.
- Phenylmethylisobutylthiocarbamide (STOERMER and VON LEPEL), A., i, 662.
- 1 : 5-Phenylmethylisodithiobiazolone and its compound with methylic iodide (BUSCH), A., i, 190.
- α -Phenylmethylhydrazine, hydrofluoride (GRIMALDI), A., i, 221.
- as*-Phenylmethylhydrazine, behaviour of, towards formaldehyde (GOLDSCHMIDT), A., i, 513.
- amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- $\beta\beta$ -Phenylmethylhydrazinobenzylmalonic acid, ethylic salt of, and its salts (GOLDSTEIN), A., i, 436.

- Phenylmethylhydrazinosulphamic acid, ammonium salt of (PAAL and JÄNICKE), A., i, 235.
- Phenylmethyl-4-ketopyrazolonephenylhydrazone, identity of, with 1:3-phenylmethylpyrazolone-4-azobenzene (AUTENRIETH), A., i, 700.
- 1:3:5-Phenylmethylketotetrahydropyridazine-4-carboxylic acid (RUPE and HEBERLEIN), A., i, 363.
- 2:4-Phenylmethylpentoxazoline and its picrate (LÜCHMANN), A., i, 545.
- Phenylmethylphenosfluorindine and its platinochloride, hydrochloride, and benzoyl derivative (KEHRMANN and BÜRGIN), A., i, 512.
- Phenylmethylpropylamine, nitroso- (STOERMER and VON LEPEL), A., i, 662.
- Phenylmethylpropylearbamide (STOERMER and VON LEPEL), A., i, 663.
- Phenylmethylpropylthiocarbamide (STOERMER and VON LEPEL), A., i, 662.
- 3:5-Phenylmethylpyrazole, formation of (GOLDSCHMIDT), A., i, 189.
- 1:3-Phenylmethylpyrazolone, 4-oxime of (JOVITSCHITSCH), A., i, 83.
- 1:3-Phenylmethylpyrazolone-4-azobenzene: its mononitro- and dinitro-derivatives (AUTENRIETH), A., i, 627, 700.
- identity of, with Knorr's phenylmethyl-4-ketopyrazolonephenylhydrazone (AUTENRIETH), A., i, 700.
- 1:3:5-Phenylmethylpyrazolone-4-carboxylic acid, ethylic salt of (SCHOTT), A., i, 700.
- 1:5-Phenylmethylthiobiazoline, 3-hydrosulphide, and its potassium salt (BUSCH), A., i, 190.
- bisulphide (BUSCH), A., i, 190.
- Phenylmethylurethane, from methylsynbenzhydroxamic acid (WERNER and SUBAK), A., i, 431.
- ba-Phenylmethylureidoacetic acid and its ethylic salt (PAAL and GAUSER), A., i, 225.
- Phenyl-naphthalene, *p*-nitro- (KÜHLING), A., i, 237.
- Phenyl- β -naphthapyrazine (FEIST and ARNSTEIN), A., i, 258.
- Phenyl-*m*-nitro-*o*-aminobenzazoimide (KRATZ), A., i, 365.
- Phenyl-*m*-nitrobenzoylsemicarbazide (CURTIUS and HOFMANN), A., i, 647.
- Phenyl-4-nitro-1:2-azimidobenzene (NIETZKI and ALMENRÄDER), A., i, 164.
- Phenyl-*o*-nitrobenzylidenehydrazone, acetyl and benzoyl derivatives of, and their behaviour with phenylhydrazine (WALTHER), A., i, 542.
- Phenyl-*m*-nitrobenzylidenehydrazone, acetyl and benzoyl derivatives of, and their behaviour with phenylhydrazine (WALTHER), A., i, 542.
- Phenyl-*p*-nitrobenzylidenehydrazone, acetyl and benzoyl derivatives of, and their behaviour with phenylhydrazine (WALTHER), A., i, 542.
- Phenyl-*o*-nitrobenzyl nitrosamine, *p*-bromo- (BUSCH and HEINEN), A., i, 159.
- Phenyl-*o*-nitrobenzyl nitrosamine, *p*-chloro- (BUSCH and VOLKENING), A., i, 159.
- α -Phenyl-*o*-nitrocinnamic acid (PSCHORR), A., i, 303.
- Phenylnitromethane. See Toluene, ω -nitro-.
- iso-Phenylnitromethane and its copper salt (HANTZSCH and SCHULTZE), A., i, 672.
- p*-bromo- (HANTZSCH and SCHULTZE), A., i, 672.
- Phenyl- α *p*-nitrophenyl-*p*-phenylmethylformazyl (BAMBERGER), A., i, 540.
- Phenyl nitrosamine, nitro-, sodium compound of, condensation of, with nitrobenzene (KÜHLING), A., i, 236.
- 5-Phenyloxazoline (GABRIEL and STELZNER), A., i, 121.
- reduction of (GABRIEL and STELZNER), A., i, 702.
- Phenylphenanthrapyrazine (FEIST and ARNSTEIN), A., i, 258.
- μ -Phenylphenanthridine: its hydrochloride and platinochloride (PICTET and HUBERT), A., i, 53, 483.
- Phenylphenosfluorindine and its hydrochloride and benzoyl derivative (KEHRMANN and BÜRGIN), A., i, 512.
- Phenyl-*o*-phenylenediamine, condensation of, with β -naphthaquinone-sulphonic acid (KEHRMANN and LOCHER), A., i, 700.
- condensation of, with acetamidonaphthaquinone (KEHRMANN and HERTZ), A., i, 508.
- condensation of, with dihydroxyquinone and dihydroxytoluquinone (KEHRMANN and FÜHNER), A., i, 511.
- oxidation of (FISCHER and DISCHINGER), A., i, 539.
- Phenylpropionic acid, action of acetic anhydride on (MICHAEL and BUCHER), A., i, 85.
- β -Phenylpropionic acid (*hydrocinnamic acid*), magnetic rotatory power.

- &c., of the ethylic salt of (PERKIN), T., 1064, 1077, 1078, 1175, 1238.
- β -Phenylpropionic acid (*hydrocinnamic acid*), β -chloro- α -iodo-, and its ethylic and methylic salts (ERLENMEYER), A., i, 302.
- o*-nitro- (REISSERT), A., i, 371.
- Phenylpropionitrile, occurrence of (HOFMANN LECTURE), T., 719.
- Phenylisopropyl nitromethane, labile form of (KONOWALOFF), A., i, 676.
- β -Phenyl- μ -propylphenyloxazole and its salts (MINOVICI), A., i, 703.
- 1 : 1'-Phenylpropyltetrahydroazindone (GOLDSTEIN), A., i, 436.
- 1 : 1'-Phenylpropyltetrahydroazindone-2'-carboxylic acid and its salts (GOLDSTEIN), A., i, 436.
- 1 : 3-Phenylpyrazolidone and its hydrochloride (HARRIES and LOTH), A., i, 321.
- Phenylpyrazolidone, acetyl derivative of (HARRIES and LOTH), A., i, 321.
- 1 : 3-Phenylpyrazolone and its hydrochloride and 2-acetyl derivative (HARRIES and LOTH), A., i, 321.
- 4 (?) -nitro- (HARRIES and LOTH), A., i, 321.
- Phenylpyridine, *p*-nitro-, from di-*p*-nitrodiazobenzene sulphide (BAMBERGER and KRAUS), A., i, 219.
- 2-Phenylpyridine (KÜHLING), A., i, 237; (LEBEN), A., i, 575.
- p*-amino-, and its hydrochloride and pierate (KÜHLING), A., i, 236.
- 2-Phenyl-6-pyridone and its hydrochloride, aurochloride, and platinochloride (LEBEN), A., i, 575.
- 4'-Phenylquinazolone (GABRIEL and STELZNER), A., i, 506.
- 2'-chloro- (GABRIEL and STELZNER), A., i, 507.
- Phenylquinoline, *p*-nitro- (KÜHLING), A., i, 237.
- Phenylrosaniline, preparation of (HOFMANN LECTURE), T., 615.
- Phenylselenious acid and its nitrate and silver salt (KRAFFT and LYONS), A., i, 304.
- Phenylsemicarbazide and its hydrochlorides (CURTIUS and HOFMANN), A., i, 648.
- acetyl, chloroacetyl, phenylglycyl, and propionyl derivatives of (WIDMAN), A., i, 629.
- benzylidene derivative of (CURTIUS and HOFMANN), A., i, 648.
- butyryl, isobutyryl, benzoyl, cinnamoyl, and isovaleryl derivatives of (WIDMAN), A., i, 630.
- cinnamylidene derivative of (CURTIUS and HOFMANN), A., i, 648.
- Phenylsemicarbazide, *o*-hydroxybenzylidene derivative of (CURTIUS and HOFMANN), A., i, 648.
- Phenylsemicarbazidecarboxylic acid, ethylic salt, and its hydrochloride and thiocarbamide (RUPE), A., i, 429.
- β -Phenyl- μ -styryloxazole and its salts (MINOVICI), A., i, 704.
- Phenylsuccinimide, velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.
- Phenyltartronic acid, 2 : 4 : 6-*trinitro*-, ethylic salt of (JACKSON and PHINNEY), A., i, 234.
- 2'-Phenyltetrahydroquinazoline, *m*-nitro- (BUSCH), A., i, 507.
- 4'-Phenyltetrahydroquinazoline and its hydrochloride (GABRIEL and STELZNER), A., i, 506.
- 4'-Phenyltetrahydro-2'-quinazolone and its acetate (GABRIEL and STELZNER), A., i, 506.
- Phenylthicallophanic acid, ethylic salt. See Phenylcarboxyethylthiourea.
- iso*-Phenylthioallophanic acid, ethylic salt, identity of, with phenylcarboxyethylthiocarbamide (DORAN), T., 342, 344; P., 1896, 75.
- 1-Phenylthiobiazoline bisulphide (BUSCH), A., i, 190.
- 3-hydrosulphide (BUSCH), A., i, 190.
- 3-methosulphide (BUSCH), A., i, 191.
- Phenylthiocarbamic acid, *m*-phenylene salt of (SNAPE), T., 101; P., 1896, 13.
- p*-phenylene salt of (SNAPE), T., 101; P., 1896, 13.
- ψ -Phenylthiocarbamic acid, phenylic salt of (SNAPE), T., 99; P., 1896, 13.
- Phenylthiocarbamide, action of ethylic chlorocarbonate on, and its acetyl derivative (DORAN), T., 342.
- Phenylthiocarbazinic acid, interaction of, with aldehydes (BUSCH), A., i, 190.
- bisulphide (BUSCH and STERN), A., i, 677.
- methylic salt of (BUSCH), A., i, 191.
- Phenylthiocarbimide (DUNLAP), A., i, 471.
- preparation of (HOFMANN LECTURE), T., 710.
- action of benzoic chloride on (HOFMANN LECTURE), T., 712.
- action of, on glycol (SNAPE), T., 100; P., 1896, 13.
- action of, on phenol (SNAPE), T., 98; P., 1896, 12.
- action of phosphorus pentachloride on (HOFMANN LECTURE), T., 712.

- Phenylthiocarbimide, action of, on quinol (SNAPE), T., 99; P., 1896, 13.
 action of, on resoreinol (SNAPE), T., 99; P., 1896, 13.
- Phenylthiodiazobenzene from *p*-chlorobenzene anhydride (BAMBERGER), A., i, 299.
- Phenylthiosemicarbazide (BUSCH and STERN), A., i, 677.
- 4'-Phenylthiotetrahydroquinazoline (GABRIEL and STELZNER), A., i, 506.
- p*-bromo- (BUSCH and HEINEN), A., i, 159.
- o*-chloro- (BUSCH and BRUNNER), A., i, 157.
- m*-chloro- (BUSCH and FRANCIS), A., i, 158.
- p*-chloro- (BUSCH and VOLKENING), A., i, 158.
- n*-Phenylthiouramido- μ -methylimidazoline. See μ -Methylimidazolylphenylthiourea.
- Phenylthiourea (DIXON), T., 857.
- o*-Phenyltoluene (*o*-methyldiphenyl) (JACOBSON and NANNINGA), A., i, 97.
- 4 : 4'-diiodo- (JACOBSON and NANNINGA), A., i, 97.
- m*-Phenyltoluene (*m*-methyldiphenyl) (JACOBSON and LISCHKE), A., i, 97.
- 4 : 4'-diiodo- (JACOBSON and LISCHKE), A., i, 97.
- p*-Phenyltoluene, *p*-nitro-, from di-*p*-nitrodiazobenzene sulphide (BAMBERGER and KRAUS), A., i, 219.
- Phenyl-*p*-toluic acid, *m*-nitro-, and its salts (LIMPRICHT and FALKENBERG), A., i, 43.
- Phenyl-*p*-toluidoaetic acid (MILLER and PLÖCHL), A., i, 610.
- Phenyltolylamine, discovery of (HOFMANN LECTURE), T., 615.
- o*-amino-. See *p*-Tolyl-*o*-phenylene-diamine.
- Phenyl-*p*-tolylbenzamidine: its nitrate, hydrochloride, and picrate (MARCKWALD), A., i, 30.
- Phenyl-*p*-tolylmethane? (WEILER), A., i, 237.
- Phenyltriethylammonium hydroxide, action of heat on (HOFMANN LECTURE), T., 666.
- Phenyltrimethylammonium chloride, action of heat on (HOFMANN LECTURE), T., 670.
- iodide, action of heat on (HOFMANN LECTURE), T., 721.
- Phenylurazole (RUPE), A., i, 429.
- p*-Phenylureidobenzenesulphonic acid and its salts (PAAL and GANSER), A., i, 224.
- o*-Phenylureidocinnamic acid and its salts (PAAL and GANSER), A., i, 224.
- m*-Phenylureidocinnamic acid and its salts and dibromide (PAAL and GANSER), A., i, 224.
- p*-Phenylureidocinnamic acid and its ethylic salt (PAAL and GANSER), A., i, 224.
- o*-Phenylureidophenylpropionic acid (PAAL and GANSER), A., i, 224.
- dibromide of (PAAL and GANSER), A., i, 224.
- m*-Phenylureidophenylpropionic acid (PAAL and GANSER), A., i, 224.
- p*-Phenylureidophenylpropionic acid (PAAL and GANSER), A., i, 224.
- Phenylurethane derivative of bromo- ψ -cumenol. See ψ -Cumenol.
- m*-nitro- (STRUVE and RADENHAUSEN), A., i, 35.
- p*-nitro- (STRUVE and RADENHAUSEN), A., i, 36.
- Phenylvinylcarbamide (GABRIEL and STELZNER), A., i, 122.
- Phenylvinylthiocarbamide (GABRIEL and STELZNER), A., i, 122.
- Phillipsite from Prussian Silesia (KRUSCH), A., ii, 532.
- Philothion in germinating seeds (REY-PAILHADE), A., ii, 326.
- Phleum pratense*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Phloridzin, action of, in causing glycosuria (ZUNTZ), A., ii, 667.
- Phloroglucinol in red grapes (SOSTEGNI), A., ii, 122.
- condensation of, with anthranilic acid (NIEMENTOWSKI), A., i, 261.
- Phonolite from East Lothian (HATCH), A., ii, 116.
- iso*-Phorone, reduction of (KERP), A., i, 448.
- oxime (KERP), A., i, 447.
- Phosgenite, artificial (FRIEDEL), A., ii, 32.
- Phosgenepyronines (MEYENBURG), A., i, 292.
- Phosphanilide, compound of aniline with (MICHAELIS and SILBERSTEIN), A., i, 344.
- Phosphates, mineral, from Algeria (CARNOT), A., ii, 34; (MALBOT), A., ii, 185.
- mineral, genesis of (GAUTIER), A., ii, 185.
- Phosphates. See under Phosphorus and also Agricultural chemistry. (Appendix.)

Phosphazo-compounds. See Oxyphosphazo.

"Phosphine," preparation of (HOFMANN LECTURE), T., 616.

Phosphines. See under Phosphorus.

Phosphochlorosulphaminebenzoic chloride. See Sulphaminebenzoic chloride.

Phosphoric acid (SIEGFRIED), A., i, 660.

as a source of carbonic anhydride in muscle (KRÜGER), A., ii, 487.

estimation of (BALKE and IDE), A., ii, 632.

Phosphorised constituent of plant seeds (SCHULZE and WINTERSTEIN), A., i, 516.

Phosphorus, spark spectrum of compounds containing (DE GRAMONT), A., ii, 585.

volatility of red (ARCTOWSKI), A., ii, 559.

action of, on some metallic chlorides (GRANGER), A., ii, 603.

poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

influence of, on the nutrition of plants (STOKLASA), A., ii, 266.

Phosphorus pentabromide, formation of, from phosphorus oxychloride and hydrobromic acid (BESSON), A., ii, 472.

trichloride, action of potassium bromide and iodide on (SNAPE), A., ii, 641.

oxychloride, action of hydriodic acid on (BESSON), A., ii, 472.

oxychlorodibromide (BESSON), A., ii, 472.

oxydichlorobromide (BESSON), A., ii, 472.

hydride (*phosphine*), action of sulphuric chloride on (BESSON), A., ii, 417.

phosphonium bromide and iodide, action of carbonyl chloride on (BESSON), A., ii, 358, 359.

thioiodide (BESSON), A., ii, 560.

pentoxide, vapour density of (TILDEN and BARNETT), T., 154; P., 1896, 30.

Phosphoric acid, freezing points of dilute solutions of (LOOMIS), A., ii, 352.

compound of iodic acid and (CHRÉTIEN), A., ii, 652.

sources of, in urine (CAMERER), A., ii, 379.

Superphosphates from Algeria (MALBOT), A., ii, 185.

Phosphoric acid, triethylic salt, heat of formation of (CAVALIER), A., ii, 590.

Phosphorus :—

Phosphoric acid, estimation of, gravimetrically (KILGORE), A., ii, 335; (GLADDING), A., ii, 336.

estimation of, volumetrically (KILGORE), A., ii, 335; (VEITCH), A., ii, 543.

estimation of, by the molybdenum method (NEUBAUER), A., ii, 73.

estimation of, in presence of organic matter (MALBOT), A., ii, 186.

estimation of, by the citrate method (RIMYAN and WILEY), A., ii, 126; (BERGAMI), A., ii, 273; (REITMAIR), A., ii, 575.

estimation of citrate-soluble, in basic slags (WAGNER), A., ii, 448; (PASSON), A., ii, 575.

estimation of, in soils (WOOD), T., 291; P., 1896, 13; (WILLIAMS), A., ii, 334.

insoluble, estimation of, volumetrically (EDWARDS), A., ii, 273.

insoluble, separation of, in case of both bone and mineral phosphate (BRYANT), A., ii, 623.

Metaphosphoric acid, vapour density of (TILDEN and BARNETT), T., 158; P., 1896, 30.

Phosphorous acid, methylic salt, preparation of (HOFMANN LECTURE), T., 682.

Phosphorus trisulphide (BESSON), A., ii, 560.

thiophosphoryl bromodichloride (BESSON), A., ii, 520.

chlorodibromide (BESSON), A., ii, 520.

chloride, action of hydriodic acid on (BESSON), A., ii, 560.

Phosphines, primary and secondary, preparation of (HOFMANN LECTURE), T., 681, 682.

oxychloro-, secondary, action of heat on (MICHAELIS and SILBERSTEIN), A., i, 344.

oxides, tertiary (MICHAELIS and SILBERSTEIN), A., i, 344.

Phosphorus, microchemical reagents for (HEINE), A., ii, 536.

estimation of, gravimetrically (MEILLÈRE), A., ii, 389.

estimation of, volumetrically (LINDEMANN and MOTTEU), A., ii, 388.

estimation of, modified molybdate solution for (WINTON), A., ii, 622.

estimation of, by citrate process (MACH and PASSON), A., ii, 389.

estimation of, in iron and iron ores containing titanium (PATTINSON and PATTINSON), A., ii, 389.

- Phosphorus, estimation of, in toxicological cases (SPICA), A., ii, 218.
- Photographic plate, action of metals on a (PELLAT; COLSON), A., ii, 601.
- Photography. See Light.
- Phrenosin, "chemolysis" of (THUDICHUM), A., i, 400.
- Phrenylin (THUDICHUM), A., i, 400.
- Phthalaldehydemethylaniline (*phthalaldehydemethylanilide*) (GLOGAUER), A., i, 684.
- Phthalaldehyde- α -naphthylamic acid (GLOGAUER), A., i, 684.
- Phthalaldehyde- β -naphthylamic acid (GLOGAUER), A., i, 684.
- Phthalaldehyde-*p*-toluidinic acid (GLOGAUER), A., i, 684.
- o*-Phthalaldehydic acid, condensation of, with dimethylaniline (EBERT), A., i, 441.
- condensation of, with 2'-methylquinoline (NENCKI), A., i, 256.
- semicarbazone (LIEBERMANN), A., i, 233.
- Phthalaldehydic acid tetrahydroquinolinic lactone (LIEBERMANN), A., i, 233.
- Phthalaldehydic acid tetrahydroquinolide. See Phthalaldehydic acid tetrahydroquinolinic lactone.
- Phthalaldehydic- α -naphthylamine (*phthalaldehydic- α -naphthylamide*) (GLOGAUER), A., i, 684.
- Phthalaldehydic- β -naphthylamine (GLOGAUER), A., i, 684.
- Phthalaldehydicpiperidine (*phthalaldehydicpiperidine*) (GLOGAUER), A., i, 684.
- Phthalaldehydic-*p*-toluidine (*phthalaldehydic-*p*-toluidide*) (GLOGAUER), A., i, 684.
- Phthalaldehydictetrahydroisoquinoline (*phthalaldehydictetrahydroisoquinolide*) (GLOGAUER), A., i, 684.
- Phthalanil (DUNLAP), A., i, 471.
- Phthalanilic acid (DUNLAP), A., i, 471.
- iso*-Phthalazoimide (CURTIUS and DAVIDIS), A., i, 681.
- Phthaleins, action of sunlight on (OGLOBIN), A., i, 649.
- Phthalic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- ethylic salt, magnetic rotatory power, &c., of the (PERKIN), T., 1064, 1132, 1177, 1238.
- Phthalic acid, *tetrabromo*-, methylic salt of (RUPP), A., i, 619.
- α -iodo-, and its potassium and barium salts (EDINGER), A., i, 503.
- β -iodo-, and its normal copper and silver salts (EDINGER), A., i, 503.
- Phthalic acid, *tetrio*do-, and its methylic salt (RUPP), A., i, 619.
- mononitro-derivatives of (VAUBEL), A., i, 646.
- β -nitro-, ethylic salt of (EDINGER), A., i, 502.
- dinitro-derivatives of (VAUBEL), A., i, 646.
- α -Phthalic acid and its salts (HOWE), A., i, 480.
- β -Phthalic acid and its salts (HOWE), A., i, 480.
- Phthalic anhydride, action of carbamide on (DUNLAP), A., i, 471.
- action of thiocarbanilide on (DUNLAP), A., i, 471.
- condensation of, with anisoil (GRANDE), A., i, 563.
- Phthalic anhydride, *tetrabromo*- (RUPP), A., i, 619.
- α -iodo- (EDINGER), A., i, 503.
- tetrio*do- (RUPP), A., i, 619.
- Phthalic chloride, magnetic rotatory power, &c., of (PERKIN), T., 1205, 1244.
- condensation of resorcinol with (PAWLEWSKI), A., i, 50.
- iso*-Phthalic acid, heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- Phthalic acid, ethylic salt, magnetic rotatory power, &c., of (PERKIN), 1132, 1177, 1238.
- tetrabromo*- (RUPP), A., i, 618.
- tetra*-chloro- (RUPP), A., i, 618.
- tetrio*do- (RUPP), A., i, 619.
- p*-Phthalic acid. See Terephthalic acid.
- Phthalidyl-2'-methylquinoline and its platinochloride and aurochloride (NENCKI), A., i, 256.
- Phthalidyl-1:3:2'-trimethylquinoline (NENCKI), A., i, 256.
- Phthalimide (DUNLAP), A., i, 471.
- decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
- α -iodo- (EDINGER), A., i, 502.
- β -iodo- (EDINGER), A., i, 503.
- Phthalonitrile (PINNOW and SÄMANN), A., i, 367.
- Phthalylacetoxylamine (ERRERA), A., i, 223.
- Phthalylamidoacetic acid, ethylic salt (RADENHAUSEN), A., i, 137.
- Phthalylhydrazide (RADENHAUSEN), A., i, 138; (CURTIUS and DAVIDIS), A., i, 680.
- iso*-Phthalylhydrazide, hydrochloride, platinochloride, isopropylidene, benzylidene derivatives (CURTIUS and DAVIDIS), A., i, 680.
- iso*-Phthalylhydrazidoacetoacetic acid,

- ethylic salt (CURTIUS and DAVIDIS), A., i, 681.
- Phthalylhydroxylamine, ammonio-derivative of (ERRERA), A., i, 223.
- Phycocyanin, the crystalline colouring matter of certain algæ (MOLISCH), A., i, 660.
- Phyllocyanic acid (SCHUNCK and MARCHLEWSKI), A., i, 574.
composition of and absorption bands of (TSCHIRCH), A., i, 624.
- Phyllocyanin, absorption bands of (SCHUNCK and MARCHLEWSKI), A., i, 574.
- Phylloporphyrin (SCHUNCK and MARCHLEWSKI), A., i, 496, 574.
- Phyllopurpuric acid (SCHUNCK and MARCHLEWSKI), A., i, 574.
preparation of (TSCHIRCH), A., i, 624.
- Phyllotaonin, properties of (SCHUNCK and MARCHLEWSKI), A., i, 181.
- Phylloxanthin, absorption bands of (SCHUNCK and MARCHLEWSKI), A., i, 574.
- Physcia*, occurrence of atranoric and hæmatommic acids in different species of (ZOPF), A., i, 103.
- Physcihydrone, composition of (HESSE), A., i, 60.
- Physiological action, relation of, to chemical constitution (BLUMENTHAL), A., ii, 377.
comparative, of ortho- and para-compounds (BOKORNY), A., ii, 668.
of cadmium (PADERI), A., ii, 491.
of cadmium and zinc salts (ATHANASIU and LANGLOIS), A., ii, 319.
of thallium (CURCI), A., ii, 491.
of acetylene (GRÉHANT; BERTHELOT; MOISSAN), A., ii, 200; (BROCINER), A., ii, 264; (ROSEMAIN), A., ii, 492.
of alloxan (LUSINI), A., ii, 492.
of amidosulphonic acid (LOEW), T., 1662; P., 1896, 182.
of arginine (SCHULZE), A., ii, 383.
of caffeine (ALBANESE), A., ii, 492.
of canadine (VON BUNGE), A., ii, 493.
of cinnamic acid (HOFMANN LECTURE), T., 698.
of gentisic acid (LIKHATSCHIEFF), A., ii, 492.
of heteroxanthine (KRÜGER and SALOMON), A., ii, 200.
of hydrastine derivatives (FALK), A., ii, 201.
of hydrastinine (VON BUNGE), A., ii, 492.
of matrine (PLUGGE), A., i, 68.
of methylhydrastamide and methylhydrastimide (FALK), A., ii, 201.
- Physiological action of methylnarcotamide and methylnarcotimide (FALK), A., ii, 201.
of narcotine derivatives (FALK), A., ii, 201.
of parabanic acid (LUSINI), A., ii, 492.
of theobromine (ALBANESE), A., ii, 492.
of derivatives of tropeine (MERCK), A., i, 65.
- Physostigmine. See Eserine.
- Phytolacca decandra*, juice of (HILGER and MAI), A., i, 496.
red dye of fruit of (WEIGERT), A., i, 388.
- Picea vulgaris*, oil of (UMNEY), A., i, 380.
- Pickeringite from Carinthia (BRUNLEOHNER), A., ii, 256.
from New South Wales (CARD), A., ii, 251, 520.
from the river Mana (ALEXÉEFF), A., ii, 566.
- Picric acid, preparation of (HOFMANN LECTURE), T., 641.
absorption of, by silk (WALKER and APPLEYARD), T., 1339, 1343; P., 1896, 147.
methylanides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
- Picric acid, barium salt, water of crystallisation of (SHAW), A., i, 354.
dibutylamine salt (BERG), A., i, 8.
- Picric chloride, action of mercuric and lead thiocyanates on (DIXON), T., 868; P., 1896, 101.
- Picro- ψ -aconitine and salts (FREUND and NIEDENHOFHEIM), A., i, 451.
- Pieryl nitrodehyropiperidide (FRANCHIMONT and TAVERNE), A., i, 603.
- Pieryl piperidide (FRANCHIMONT and TAVERNE), A., i, 603.
- Pieryl thiocarbimide, attempted preparation of (DIXON), T., 868; P., 1896, 101.
- Piedmontite from Maryland (HILLEBRAND), A., ii, 40.
- Pieridæ, pigments of the (HOPKINS), A., ii, 198.
- Pigments of Pieridæ (HOPKINS), A., ii, 198.
- Pigeon manure. See Agricultural chemistry (Appendix).
- Pilocarpine, constitution of (HERZIG and MEYER), A., i, 68.
- Pimelic acid (isopropylsuccinic acid) from tetrahydrocarvone (VON BAEYER), A., i, 248.
- Pimelite from Pennsylvania (GOLD-SMITH), A., ii, 36.

- Pinacolic alcohol. See Hexylic alcohols.
- Pinacolin, constitution of (DELACRE), A., i, 591, 662.
 action of halogen acids on (DELACRE), A., i, 591.
 oxidation of (GLÜCKSMANN), A., i, 333.
 bromide, action of alcoholic potash on (DELACRE), A., i, 591.
- Pinacolythiocarbamide and its platinochloride and ethyl derivative (HEILPERN), A., i, 603.
- Pinacone (*hexyleneglycol*), heat of combination of, with water in the liquid and solid states (PICKERING), A., ii, 148.
 action of hydrogen bromide on (DELACRE), A., i, 591.
- Pinacone, $C_{18}H_{30}O_2$, from reduction of camphorone (KERP), A., i, 448.
- Pinacone, $C_{18}H_{34}O_2$ from reduction of isophorone (KERP), A., i, 447.
- Pinene, constitution of (ARMSTRONG), T., 1399; P., 1896, 44; (TILDEN), T., 1009; P., 1896, 137; (TIEMANN), A., i, 381.
 relation of, to citrene (ARMSTRONG), P., 1896, 44.
 conversion of, into camphene (REYCHLER), A., i, 620.
 borneol from (REYCHLER), A., i, 308.
 capacity of, for bromine (TILDEN), T., 1009; P., 1896, 137.
 oxidation of (VON BAEYER), A., i, 245.
 acids from the oxidation of (WAGNER and ERTSCHIKOWSKY), A., i, 380.
- Pinene bromide, from pinene and hypobromous acid (WAGNER and GINZBERG), A., i, 381.
 dibromide, from the tetrabromide (TILDEN and NICHOLLS), P., 1896, 138.
 hydrochloride, activity of (ARMSTRONG), T., 1398.
 behaviour of, towards nitric acid (ARMSTRONG), T., 1401.
 nitrosochloride, behaviour of, towards halogen hydrides (VON BAEYER), A., i, 246.
- Pinguite from Bohemia (KATZER), A., ii, 188.
- Pinic acid (VON BAEYER), A., i, 247.
 from α -pinonic acid (VON BAEYER), A., i, 308.
 bromo- (VON BAEYER), A., i, 620.
- Pinnoite, formula of (KOSMANN), A., ii, 368.
- Pinole, constitution of (TILDEN), T., 1014; (WALLACH), A., i, 101.
- Pinoleglycol, from pinole dibromide (WALLACH), A., i, 101.
 anhydride (WALLACH), A., i, 571.
 monochlorhydrin, from pinene and hypochlorous acid (WAGNER and GINZBERG), A., i, 381.
- Pinole hydrate, oxidation of (WALLACH), A., i, 571.
 dibromide. See 2:8-Dihydroxyhexahydro-1:6-dibromocymene.
- Pinonic acid (TIEMANN), A., i, 248.
 constitution of (TILDEN), T., 1014.
 rotation of (TIEMANN and SEMMLER), A., i, 309.
- d*-Pinonic acid, semicarbazone, and oxime (TIEMANN and SEMMLER), A., i, 309.
- l*-Pinonic acid, semicarbazone, and oxime (TIEMANN and SEMMLER), A., i, 309.
- α -Pinonic acid, oxime and phenylhydrazone of (VON BAEYER), A., i, 246.
 oxidation of (VON BAEYER), A., i, 308.
 semicarbazone (TIEMANN and SEMMLER), A., i, 309.
- Pinononic acid, oxime, behaviour of, towards alkali hypobromite (WAGNER and ERTSCHIKOWSKY), A., i, 380.
- Pinoylformic acid, silver salt, phenylhydrazone, potassium hydrogen sulphite and sodium hydrogen sulphite compounds (VON BAEYER), A., i, 621.
- Pinus densiflora*, effect of lime and magnesia on development of (LOEW and HONDA), A., ii, 446.
sylvestris, oil of (UMNEY), A., i, 380.
pumilio, oil of (UMNEY), A., i, 380.
- 2-Pipecoline hydrogen racemate (MARCKWALD), A., i, 253.
- d*-2-Pipecoline (MARCKWALD), A., i, 253.
d-hydrogen tartrate and its hydrochloride, picrate, and dithiocarbamate (MARCKWALD), A., i, 253.
l-hydrogen tartrate (MARCKWALD), A., i, 253.
- l*-2-Pipecoline (MARCKWALD), A., i, 253.
d-hydrogen tartrate (MARCKWALD), A., i, 253.
l-hydrogen tartrate and its hydrochloride, picrate, and dithiocarbamate (MARCKWALD), A., i, 253.
- i*-2-Pipecoline (MARCKWALD), A., i, 253.
- iso*-Pipecoline (LADENBURG), A., i, 313.
 real nature of (MARCKWALD), A., i, 253, 497.
- Pipecolinic acid (*hexahydropyridine-2-carboxylic acid*, *piperidine-2-carboxylic acid*) (WILLSTÄTTER), A., i, 319.

- Pipecolinic acid, ethylic salt (WILLSTÄTTER), A., i, 319.
 nitroso- (WILLSTÄTTER), A., i, 319.
Piper Lowong, constituents of (PEINEMANN), A., i, 494.
ovatum, preparation of piperovatine, the active principle of (DUNSTAN and CARR), P., 1895, 177.
 Piperazine, composition of (HOFMANN LECTURE), T., 688.
 condensation of, with formaldehyde, benzenesulphonic chloride, ethylic oxalate, and ethylic acetoacetate (ROSDALSKY), A., i, 257.
 ethylic oxalate (ROSDALSKY), A., i, 257.
 oxamate (ROSDALSKY), A., i, 257.
 keto-. See Ketopiperazine.
 Piperazine-1 : 4-dicarbanilide (ROSDALSKY), A., i, 257.
 Piperazine-1 : 4-dicarboxylamide (ROSDALSKY), A., i, 257.
 Piperazine-1 : 4-dicarboxylic acid, ethylic salt of (ROSDALSKY), A., i, 257.
 Piperazine-1 : 4-diphenylsulphone (ROSDALSKY), A., i, 257.
 Piperidine, constitution of (HOFMANN LECTURE), T., 723.
 condensation of, with bromocollidine (KNUDSEN and WOLFFENSTEIN), A., i, 60.
 condensation of, with α - and β -naphthol (ABEL), A., i, 254.
 derivative of bromo- ψ -eumenol and salts (AUWERS and MARWEDEL), A., i, 150.
 derivatives, stereoisomerism of (WILLSTÄTTER), A., i, 452.
 thiocyanate (DIXON), T., 860.
 chlorophosphine (MICHAELIS and LUXEMBOURG), A., i, 343.
 Piperidine, thio- (SCHENCK), A., i, 427.
 Piperidine-2-carboxylic acid. See Pipecolinic acid.
 Piperidine-3 : 4-dicarboxylic acid. See Hexahydrocinchononic acid.
 β Piperidobenzylmalonic acid, ethylic salt of, and its salts (GOLDSTEIN), A., i, 436.
 Piperidylcarboxyethylthiourea (DORAN), T., 332; P., 1896, 75.
 Piperidyl dimethylammonium hydroxide, action of heat on (HOFMANN LECTURE), T., 723.
 2 : 3-Piperidylhydroxytetrahydronaphthalene, aurochloride and platinochloride of (BAMBERGER and LODTER), A., i, 99.
 μ -Piperidylpenthiazoline, γ -bromo- (DIXON), T., 30; P., 1895, 217.
 Piperine, occurrence of, in *Piper Lowong*, (PEINEMANN), A., i, 495.
 Piperonalacetophenone (KOSTANECKI and SCHNEIDER), A., i, 614.
 Piperonaloxime, preparation of (ANGELI and RIMINI), A., i, 477.
 Piperonylaminoacetone and its salts (ANGELI), A., i, 296.
 Piperonylbenzylamine (ANGELI and RIMINI), A., i, 477.
 Piperonylmethane, nitro- (ANGELI), A., i, 296.
 Piperonylnitroacetone (ANGELI), A., i, 295.
 bromo- (ANGELI), A., i, 296.
 nitro- (ANGELI), A., i, 296.
 Piperonylonitrile, bromo- (ANGELI), A., i, 296.
 Piperonylpropylene, β -nitro- (ANGELI and RIMINI), A., i, 478.
 Piperovatine, preparation of (DUNSTAN and CARR), P., 1895, 177.
 Piperylenedicarboxylic acid from methyltropinate methiodide, and its salts (WILLSTÄTTER), A., i, 266.
 tetrabromo- (WILLSTÄTTER), A., i, 266.
 Pipette, colorimetric, for blood estimations (HOPPE-SEYLER and WINTERNITZ), A., ii, 552.
 gas (BLEIER), A., ii, 271; (LIDOFF), A., ii, 385.
Pisum sativum, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
 Pittacal. See Hexamethoxyrosolic acid.
 Placodin, preparation and properties of (ZOPF), A., i, 104.
Placodium radiosum, absence of atranoric acid in (ZOPF), A., i, 103.
saxicolum and *P. melanaspis*, occurrence of atranoric acid and zeorin in (ZOPF), A., i, 103.
 Plants, assimilation of phosphorus and lecithin by (STOKLASA), A., ii, 266.
 function of diastase in (GRÜSS), A., ii, 59.
 evolution of oxygen by (PHIPSON), A., ii, 265.
 respiration of certain (ZIEGENBEIN), A., ii, 265.
 action of arsenic on (STOKLASA), A., ii, 538.
 injurious action of cobalt and barium on (HASELHOFF), A., ii, 267.
 non-toxic effects of copper salts on (TSCHIRCH), A., ii, 329.
 effect of strychnine on the development of (OTTO), A., ii, 211.
 occurrence of arginine in (SCHULZE), A., ii, 383.

Plants, occurrence of eubchin in pipe-
 raceous (PRINRMANN), A., i, 494.
 occurrence of philothion and lacease
 in germinating seeds of certain
 (REY-PAILLHARE), A., ii, 326.
 non-occurrence of hydrogen peroxide
 in (CHOI), A., ii, 60.
 colouring matters of various British
 (PERKIN and HUMMEL), T., 1566;
 P., 1896, 185.
 dyes in (SCHRÖTTER-KRISTILLI), A.,
 ii, 208.
 See also Agricultural chemistry (Ap-
 pendix).

Plant-seeds, a phosphorised constituent
 of (SCHULZE and WINTERSTEIN), A.,
 i, 516.

Platinum, native, from Fifield, N.S.W.
 (CARD), A., ii, 251.
 specific heat of (BARTOLI and STRAC-
 CIATI), A., ii, 145.
 melting point of (HOLBORN and
 WIEN), A., ii, 87.
 fusibility of, in a wind furnace fed
 with carbon (MEYER), A., ii, 429.
 effect of carbon on the melting point
 of (HARTLEY), T., 846; P., 1896,
 98.
 rate of diffusion of, through lead
 (ROBERTS-AUSTEN), A., ii, 592.
 influence of, in promoting the com-
 bination of carbonic oxide and
 oxygen (DIXON), T., 788; P., 1896,
 56.

Platinum black, absorption of acids and
 alkalis from solutions by (KELLNER),
 A., ii, 232.

Platinum bases :
 Platosomonodiamine salts (COSSA),
 A., ii, 251.

Platinum chloride, action of magnesium
 on solutions of (VITALI), A., ii,
 420.

Chlorplatinic acid, hydrated, absorp-
 tion of moisture by (HAKE), P.,
 1896, 34.

Platinochlorides, estimation, volu-
 metric, of (DE KONINCK), A., ii, 77.

Platinum potas-sium haloid compounds
 (HERTY), A., ii, 306.

Platinisodium oxide, action of oxalic
 acid on (WERNER), A., i, 466.

Platinum silicide (VIGOUROUX), A., ii,
 600.

sulphides (ANTONY and LUCCHESI),
 A., ii, 528.

sulphide, action of metallic cyanides
 on (SCHERTEL), A., i, 197.

Platinocyanides, preparation of
 (SCHERTEL), A., i, 197.

phosphorescence of the salts of
 (JACKSON), P., 1896, 58.

Platinum :—

Platoso oxalic acids, isomeric (WER-
 NER), A., i, 465, 466.

Platinum, estimation, volumetric, of
 (DE KONINCK), A., ii, 77.

Plumbosferrite from Sjö mine, Sweden
 (IGELSTRÖM), A., ii, 307.

Pneumococcus, fermentation of sugars
 by Friedländer's (GRIMBERT), A., ii,
 322.

Poison, African arrow, from *Acokanthera*
 species (FRASER and TILLIE), A., i,
 386.

Poisons, action of heavy metals as
 (JUTT), A., i, 584.
 studies on chemical substance as, to
 algæ and infusoria (BOKORNY),
 A., ii, 669.

Polarimeter. See Light.

Pollen, composition of, of flowers, of
 the sugar beet (STIFT), A., ii, 541.

Pollucite from Maine (FOOTE), A., ii,
 660.

Polybasite, crystallisation of (PEN-
 FIELD), A., ii, 658.

Polycrase (?) from Lake Ladoga (ERD-
 MANN), A., ii, 570.

Polytymite from Sudbury, Canada
 (HILLEBRAND), A., ii, 40.

Polygala, existence of salicylic acid and
 its methylic salt in (SCHNEEGANS), A.,
 ii, 328.

Polygala Senega, existence of gaul-
 ther se in (BOURQUELOT), A., ii, 540.

Polyolithionite, constitution of (CLARKE),
 A., ii, 37.

Polymolecular reactions. See Re-
 actions.

Polyporea, amount of tannin in (NAU-
 MANN), A., ii, 538.

Polyporus sulphureus, &c., emulsin
 from (BOURQUELOT and HÉRISSEY),
 A., i, 195.

Polystichic acid (POULSSON), A., i, 387.

Polystichum spinulosum, two new acids
 from (POULSSON), A., i, 387.

Polysaccharides, action of animal secre-
 tions and organs on (FISCHER and
 NIEBEL), A., ii, 665.
 fermentation of (FISCHER and LIND-
 NER), A., i, 195.

Poppy seed oil, oxidisability of
 (BISHOP), A., ii, 399.

Potash. See Agricultural chemistry.

Potassium, fluorescence spectrum of
 the vapour of (WIEDEMANN and
 SCHMIDT), A., ii, 346.
 spark spectra of the salts of (DE
 GRAMONT), A., ii, 585.

Potassium amalgam, reduction by
 means of (HOFMANN LECTURE), T.,
 649.

Potassium salts, action of, on the coagulation of milk and blood (RINGER), A., ii, 49.

See also Agricultural chemistry.

dihydrogen arsenate, molecular weight of solid (FOCK), A., ii, 160.

metaselenoarsenate (CLEVER and MUTHMANN), A., ii, 18.

oxyselenoarsenate (CLEVER and MUTHMANN), A., ii, 18.

thioselenoarsenate (CLEVER and MUTHMANN), A., ii, 18.

monothioarsenate (WEINLAND and RUMPF), A., ii, 473.

hydrogen monothioarsenate (WEINLAND and RUMPF), A., ii, 473.

dihydrogen monothioarsenate (WEINLAND and RUMPF), A., ii, 473.

bromide, thermal expansion of solutions of (DE LANNOY), A., ii, 233.

freezing points of aqueous solutions of (PONSOT), A., ii, 412.

tribromide, di-dissociation in solution of (JAKOWKIN), A., ii, 514.

carbonate, freezing points of dilute solutions of (LOOMIS), A., ii, 352.

chlorate, manufacture of (BAYER), A., ii, 517.

electrolytic conductivity of solutions of (BAUR), A., ii, 144.

action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.

liberation of chlorine on heating manganese dioxide with (MCLEOD), T., 1015; P., 1896, 141.

velocity of the reaction in acid solution of potassium iodide and (SCHLUNDT), A., ii, 297.

case of poisoning with (BRANDENBURG), A., ii, 491.

chloride, electrolytic conductivity of aqueous solutions of (MALTBY), A., ii, 144.

electrical conductivity of solutions in acetone of (LASZCZYNSKI), A., ii, 555.

freezing points of aqueous solutions of (PONSOT), A., ii, 412.

freezing points of dilute solutions of (WILDERMANN), A., ii, 351; (LOOMIS), A., ii, 352; (ABEGG), A., ii, 588.

freezing points of concentrated aqueous solutions of (ROLOFF), A., ii, 291.

action of magnesium on solutions of (VITALI), A., ii, 420.

dichromate, electrochemical preparation of (LORENZ), A., ii, 651.

ferrate (MOESER), A., ii, 250.

Potassium ferrite (MOESER), A., ii, 250.

molybdenum oxyfluorides (MARCHETTI), A., ii, 20.

orthosulphoxyantimonate (MCCAY), A., ii, 305.

niobium oxyfluoride (MARCHETTI), A., ii, 20.

tungsten oxyfluorides (MARCHETTI), A., ii, 20.

platinum haloid compounds (HERTY), A., ii, 306.

barium imidosulphonates (DIVERS and HAGA), T., 1622.

mercury imidosulphonate (DIVERS and HAGA), T., 1621.

iodate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.

hypoiodite, velocity of decomposition of (NOYES and SCOTT), A., ii, 158.

iodide, electrical conductivity of solutions of, in acetone (LASZCZYNSKI), A., ii, 555.

electrolysis of a solution of, in acetone (LASZCZYNSKI), A., ii, 556.

velocity of the reaction in acid solution of potassium chlorate and (SCHLUNDT), A., ii, 297.

triiodide, dissociation of, in solution (JAKOWKIN), A., ii, 514.

iodomolybdate (CHRÉTIEN), A., ii, 651.

perthiomolybdate (HOFMANN), A., ii, 476.

nitrate, freezing points of dilute solutions of (LOOMIS), A., ii, 352.

nitrite, reduction of (DIVERS and HAGA), T., 1612; P., 1896, 179.

nitrosulphate, preparation and reduction of (DIVERS and HAGA), T., 1611; P., 1896, 179.

nitrosodisulphonate, constitution of (HANTZSCH and SEMPLE), A., ii, 95.

nitrosotrisulphonate, constitution of (HANTZSCH and SEMPLE), A., ii, 95.

ammoniochlorosmiate (BRIZARD), A., ii, 654.

perchlorate, molecular weight of solid (FOCK), A., ii, 160.

action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.

permanganate, electrochemical preparation of (LORENZ), A., ii, 650.

molecular weight of solid (FOCK), A., ii, 160.

action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.

poisonous effect of, on algae and infusoria (BOKORNY), A., ii, 669.

- Potassium persulphate, apparatus for showing the formation of (ELBS), A., ii, 519.
- pentaphosphide and its ammonia compound (HUGOT), A., ii, 20.
- dihydrogen phosphate, molecular weight of solid (FOCK), A., ii, 160.
- aluminium phosphates from Algeria (CARNOT), A., ii, 34.
- from Algeria and France (CARNOT), A., ii, 529.
- ruthenate, reduction of, by ammonia (BRIZARD), A., ii, 478.
- triselenide (CLEVER and MUTHMANN), A., ii, 19.
- sulphate, freezing points of aqueous solutions of (PONSOT), A., ii, 412.
- freezing points of dilute solutions of (LOOMIS), A., ii, 352; (ABEGG), A., ii, 588.
- constitution of double salts containing (TUTTON), T., 519; P., 1896, 71.
- and chloride, effect of, on germination (CLAUDEL and CROCHETTE), A., ii, 442.
- cobalt sulphate, density and optical behaviour of (TUTTON), T., 419.
- copper sulphate, density and optical behaviour of (TUTTON), T., 431.
- ferrous sulphate, density and optical behaviour of (TUTTON), T., 387.
- magnesium sulphate, density of (TUTTON), T., 355.
- optical behaviour of (TUTTON), T., 356.
- nickel sulphate, density and optical behaviour of (TUTTON), T., 407.
- uranium sulphate, phosphorescent radiations from (BECQUEREL), A., ii, 406.
- zinc sulphate, density and optical behaviour of (TUTTON), T., 374.
- titanofluoride (MARCHETTI), A., ii, 20.
- fluoroxypertitanate (PICCINI), A., ii, 178.
- ammonium paratungstate (HALLOPEAU), A., ii, 652.
- iodotungstate (CHRÉTIEN), A., ii, 652.
- zircono- and dizircono-decatungstates (HALLOPEAU), A., ii, 607.
- Potassium chromothiocyanate, absorption spectrum and constitution of (MAGNANINI), A., ii, 345.
- cobalticyanide, action of nitric acid on (JACKSON and COMEY), A., i, 402.
- cobaltioxalate (SÖRENSEN), A., i, 204.
- Potassium cyanide, action of bromine on (SCHOLL), A., i, 585.
- action of cyanogen chloride on (NEF), A., i, 73.
- action of chlorine on (NEF), A., i, 73.
- action of potassium nitrite on (HOFMANN), A., i, 69.
- action of sulphurous acid on (VON PECHMANN and MANCK), A., i, 14.
- and potassium nitrite, explosive double salt of (HOFMANN), A., i, 69.
- ferriocyanide, action of nitrous acid on (MARIE and MARQUIS), A., i, 403.
- ferrocyanide, thermal expansion of solutions of (DE LANNON), A., ii, 233.
- action of nitrous acid on (MARIE and MARQUIS), A., i, 403.
- platinocyanide, phosphorescence of (JACKSON), P., 1896, 59.
- thiocyanate, electrical conductivity of solutions of, in acetone (LASZCZYNSKI), A., ii, 555.
- electrolysis of a solution of, in acetone (LASZCZYNSKI), A., ii, 556.
- tungstic acid (HENDERSON and BARR), T., 1456; P., 1896, 169.
- Potassium, estimation of (VOGEL and HAEFCKE), A., ii, 577; (FABRE), A., ii, 624.
- estimation, volumetrically (DE KONINCK), A., ii, 77.
- estimation of, as platinochloride (WINTON), A., ii, 126.
- estimation of, in fire-clays, manures, &c. (CAMERON), A., ii, 392.
- estimation of available, in soils (WOOD), T., 287; P., 1896, 13.
- Potato tubers, respiration of (ZIEGENBEIN), A., ii, 265.
- Potato, proteids of the (OSBORNE and CAMPBELL), A., i, 715.
- Potatoes. See Agricultural chemistry (Appendix).
- Potential difference. See Electricity.
- Powellite, artificial (MICHEL), A., ii, 36.
- Praseodymium tungstate and molybdate (HITCHCOCK), A., ii, 526.
- Precipitates, washing of, with boiling water, apparatus for (JEWETT), A., ii, 123.
- Prehnite from Fassa, Tyrol (SCHNEIDER), A., ii, 38.
- Prehnitic acid, preparation of (MEYER), A., i, 547.
- Presidential address (HARCOURT), T., 563; P., 1896, 80.

- Pressure, apparatus for experiments under (WALTER), A., ii, 297.
critical. See Critical pressure.
dependence of the volume of solutions on (TAMMANN), A., ii, 13.
influence of, on the electrical conductivity of solutions (TAMMANN), A., ii, 6.
influence of, on the dielectric constant (RATZ), A., ii, 288.
influence of, on the freezing points of solutions (COLSON), A., ii, 157.
influence of, on the rate of hydrolysis of sugar and ethereal salts by acids (ROTHMUND), A., ii, 594.
of ethylic alcohol vapour, connection between temperature, volume, and (BATELLI), A., ii, 150.
of saturated vapour. See Heat.
- Primuline base. See Dehydrothiotoluidine.
- Proectite from Nordmark, Sweden (SJÖGREN), A., ii, 114.
- Propaldehyde, α -chloro- (BROCHET), A., i, 114.
- Propane, tetraethero- (SZENIC and TAGGESELL), A., i, 81.
 α -chloro- $\beta\beta$ -dinitro- (SCHOLL and MATTHAIPOULOS), A., i, 520.
 α -chloro- β -nitro- β -nitroso- (SCHOLL and MATTHAIPOULOS), A., i, 470.
 β -nitro- β -nitroso- (*propyl- ψ -nitrole*), reduction of (SCHOLL and LANDSTEINER), A., i, 198.
- cyclo*-Propane (*trimethylene*), conversion of, into propylene (TANATAR), A., i, 457.
- Propanehexacarboxylic acid (*pentanedioic-2:3:3:4-tetramethyloic acid*), hydrolysis of (BISCHOFF), A., i, 468.
methylic salt of (BISCHOFF), A., i, 468, 527.
- Propanoxymethane, 1:3:3-tribromo- (LESPIEAU), A., i, 332.
- Propanetetracarboxylic acid
[= 1:1:2:2] (BISCHOFF), A., i, 527.
- Propanetetracarboxylic acid
[= 1:2:2:3] (*pentanedioic-3-dimethyloic acid*) methylic salt (BISCHOFF), A., i, 466.
- Propanetricarboxylic acid (BISCHOFF), A., i, 527.
ethylic salt, velocity of hydrolysis of (HJELT), A., i, 600.
- Propargylpentacarboxylic acid, hydrolysis of (BISCHOFF), A., i, 601.
methylic salt (BISCHOFF), A., i, 601.
- Propene. See Allylene.
- Propeneoxymethane, 2-bromo-, action of bromine on (LESPIEAU), A., i, 332.
1:2-dibromo- (LESPIEAU), A., i, 332.
- o*-Propenylanisoil. See *o*-Anethoil.
- m*-Propenylanisoil. See *m*-Anethoil.
- Propeptone, estimation of, in beerwort (SCHJERNING), A., ii, 631.
- Provinene, 1:3-dibromo- (LESPIEAU), A., i, 332.
- Propineneoxymethane (LESPIEAU), A., i, 332.
1-bromo- (LESPIEAU), A., i, 332.
- Propiolie acid, ethylic salt, action of hydrazine on (CURTIUS), A., i, 339.
- Propionamide, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- 2-Propionamidodiphenyl (PICTET and HUBERT), A., i, 52, 483.
- Propionic acid, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1172, 1236.
melting and solidifying points of (MASSOL), A., i, 408.
action of uranium salts on (FAY), A., i, 465.
distillation of a mixture of water and (SOREL), A., i, 463.
 α -oxime of (HANTZSCH and WILD), A., i, 285.
- Propionic acid, Lead tetrapropionate (HUTCHINSON and POLLARD), T., 224; P., 1896, 31.
crotonylic salt (CHARON), A., i, 661.
diethylacetylenic salt of (ANDERLINI), A., i, 202, 203.
duroquinol salt of (RÜGHEIMER and HANKEL), A., i, 677.
ethylic and methylic salts, heat of evaporation of the (MARSHALL and RAMSAY), A., ii, 349.
phenylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1075, 1076, 1078, 1179, 1238.
- Propionic acid, α -amino-. See α -Alanine.
- β -amino- (WEIDEL and ROITHNER), A., i, 470.
ethylic salt, hydrochloride of (WEIDEL and ROITHNER), A., i, 470.
- α -bromo-, action of finely divided silver on (HELL), A., i, 10.
action of hydroxylamine on (HANTZSCH and WILD), A., i, 285.
ethylic salt, action of acetone on (PERKIN and THORPE), T., 1482.
action of ethylic chloracetate on (BISCHOFF), A., i, 466.
- dextrochloro-, ethylic salt, rotatory power of (PURDIE and WILLIAMSON), T., 829; P., 1896, 97.
- β -iodo-, unsaturated compound obtained by the action of sodium

phenoxide on (LUCHMANN),
A., i, 545.

See *enata*
p. 1053
Propionic acid, sodium salt, action of
sodium hydrogen sulphide on
(LOVÉN), A., i, 412.

ethylic salt, action of ethylic sodio-
acetoacetate on (BENTLEY and
PERKIN), T., 1511.

action of ethylic sodioisopropyl-
malonate on (HEINKE and
PERKIN), T., 1506; P., 1896,
155.

Propionic anhydride, refraction equiva-
lent of (ANDERLINI), A., ii, 229.

Propionic chloride, action of lead thio-
cyanate on (DIXON), T., 856; P.,
1896, 100.

Propionic fluoride (COLSON), A., i, 346;
(MESLANS and GIRARDET), A., i,
346.

Propionitrile, heat of evaporation of
(BECKMANN, FUCHS, and GERN-
HARDT), A., ii, 237.

action of hydrogen chloride and
acetic acid on (COLSON), A., i, 282.

Propionylurene (BAUM and MEYER),
A., i, 228.

Propionylglycollic acid, oxime of
(WOLFF and SCHWABE), A., i, 524.

α -oxime (WOLFF), A., i, 88.

acetyl derivative of (WOLFF), A., i,
88.

anhydride of (WOLFF), A., i, 88.

decomposition products of
(WOLFF), A., i, 88.

Propionylmalic acid, methylic, ethylic
salts, rotatory power of the (WAL-
DEN), A., ii, 136.

bromo-, diethylic salt, rotatory power
of (WALDEN), A., ii, 136.

Propionylmandelic acid, methylic and
ethylic salts, rotatory power of the
(WALDEN), A., ii, 138.

Propionylmesitylene, behaviour of, to-
wards phenylhydrazine (BAUM), A.,
i, 222.

Propionylphenylsemicarbazide
(WIDMAN), A., i, 629.

α -Propionyl- ν -phenylbenzylthiourea,
and the action of alkalis and silver
nitrate on (DIXON), T., 859, 860;
P., 1896, 101.

action of silver nitrate on (DIXON),
T., 859; P., 1896, 100.

α -b-Propionylphenylthiocarbamide
(DIXON), T., 856; P., 1896, 100.

action of caustic potash on (DIXON),
T., 857.

action of silver nitrate on (DIXON),
T., 857; P., 1896, 100.

α -Propionyl- β -phenylthiosemicarbazide
(DIXON), T., 860; P., 1896, 101.

Propionylphenylurea (DIXON), T.,
857.

Propionylthiocarbimide (DIXON), T.,
856; P., 1896, 100.

action of ammonia, aniline, methyl-
aniline, piperidine, and *o*-, *m*-, and
p-toluidines on (DIXON), T., 856—
862.

action of aldehyde-ammonia on
(DIXON), T., 862.

action of benzylic alcohol on (DIXON),
T., 862.

action of phenylhydrazine on (DIXON),
T., 860; P., 1896, 101.

ab-Propionyl-*o*-tolylthiocarbamide
(DIXON), T., 858; P., 1896, 100.

action of caustic potash on (DIXON),
T., 858.

ab-Propionyl-*m*-tolylthiocarbamide
(DIXON), T., 858; P., 1896, 100.

action of alkali and of silver nitrate
on (DIXON), T., 858.

ab-Propionyl-*p*-tolylthiocarbamide, and
action of alkali and of silver nitrate
on (DIXON), T., 859; P., 1896, 100.

α -Propoxypenthiiazoline, γ -bromo-
(DIXON), T., 33; P., 1895, 217.

Propyl α -hydroxybutyl ketone, density
of (ANDERLINI), A., i, 203.

iso-Propylacetic acid. See *iso*-Valeric
acid.

Propylacetoacetic acid, ethylic salt, rate
of formation of (BISCHOFF), A., i,
85.

iso-Propylacetoacetic acid, ethylic salt,
rate of formation of (BISCHOFF), A.,
i, 85.

iso-Propylacrylic acid. See Hexenoic
acids.

Propylallylacetic acid. See Octenoic
acids.

Propylallylmalonic acid, ethylic salt,
rate of hydrolysis of (HJELT), A., i,
598.

iso-Propylallylmalonic acid and its ethy-
lic salt (HJELT), A., i, 598.

hydrolysis of (HJELT), A., i, 205.

Propylamine, action of carbon bisulph-
ide on (PONZIO), A., i, 636.

β -bromo-, action of methyl- and
allyl-thiocarbimides on (DIXON),
T., 24; P., 1895, 216.

iso-Propylbenzaldehyde. See Cumin-
aldehyde.

Propylbenzene. See *n*-Cumene.

iso-Propylbenzene. See Cumene.

iso-Propylbenzoylpropionic acid
(MÜHR), A., i, 232.

α -*iso*-Propyl- β -isobutylacrylic acid. See
Decenoic acids.

3'-Propylisocarbostyryl (ALBAHARY), A.,
i, 699.

- 3'-Propylisocarbostyryl, 4'-cyano- (ALBAHARY), A., i, 699.
- α -*iso*-Propylcarboxyglutaric acid. See *iso*-Hexane- $\alpha\gamma\gamma$ -tricarboxylic acid.
- Propyl-*o*-coumaroketone. See *o*-Hydroxystyryl propyl ketone.
- Propyldihydro-*o*-coumarone (HARRIES and BUSSE), A., i, 301.
- Propyldihydro-*o*-coumaroketone. See *o*-Hydroxyphenylethyl propyl ketone.
- 1'-Propyldihydroisindole and its hydrochloride (BROMBERG), A., i, 580.
- Propylene, oxidation of, by palladinised copper oxide (CAMPBELL), A., ii, 171.
- action of acetic chloride on (KONDAKOFF), A., i, 462.
- Propylene, bromo-. See Allylic bromide.
- $\alpha\alpha$ -dibromo- (VALENTIN), A., i, 79.
- chloro-. See Allylic chloride.
- $\alpha\alpha$ -dichloro- (VALENTIN), A., i, 79.
- $\alpha\beta$ -dichloro- (SZENIC and TAGGSELL), A., i, 81.
- iodo-. See Allylic iodide.
- oxide, action of zinc dust on (KLINGER and LONNES), A., i, 375.
- Propylene- ψ -thiocarbamide (GADAMER), A., i, 415.
- action of bromine on (GADAMER), A., i, 415.
- bromo- (GADAMER), A., i, 414.
- Propylene lime, discovery of (HOFMANN LECTURE), T., 687.
- iso*-Propylethanetricarboxylic acid, ethylic salt, anil. and anilic acid of (BENTLEY, PERKIN, and THORPE), T., 273.
- iso*-Propylfuran- α -naphthaquinone, preparation of (HOOKER), T., 1370, 1372.
- iso*-Propylfuran- β -naphthaquinone, preparation of (HOOKER), T., 1369, 1376.
- azine obtained from, by the action of *o*-tolylenediamine (HOOKER), T., 1378.
- iso*-Propylglutaranilic acid (PERKIN), T., 1497; P., 1896, 170; (HEINKE and PERKIN), T., 1508.
- iso*-Propylglutaric acid (HEINKE and PERKIN), T., 1507; P., 1896, 155.
- and its salts (PERKIN), T., 1495; P., 1896, 154, 170.
- action of acetic anhydride on (PERKIN), T., 1496.
- oxidation of (PERKIN), T., 1497.
- ethylic salt (PERKIN), T., 1446.
- iso*-Propylglutaric anhydride (PERKIN), T., 1496; P., 1896, 170; (HEINKE and PERKIN), T., 1508.
- action of aniline on (PERKIN), T., 1497.
- iso*-Propylglutolaetonic acid (FITTIG and WOLFF), A., i, 136.
- action of aqueous alkalis on (FITTIG and WOLFF), A., i, 136.
- non-identity of, with terpenylic acid (FITTIG and WOLFF), A., i, 135.
- 5-*iso*-Propylheptan-2-onoic acid; its ethylic salt, semicarbazone, oxime, and phenylhydrazone (VON BAEYER), A., i, 247.
- 4-*iso*-Propylcyclohexadienecarboxylic acid and its sodium and silver salts (BAEYER and VILLIGER), A., i, 622.
- Propylcyclohexane (*propylhexahydrobenzene*, *hexahydro-n-cumene*), tribromo-derivative from (TCHITCHIBABIN), A., i, 351.
- 4-*iso*-Propylcyclohexenecarboxylic acid (*tetrahydrocuminic acid*), bromo- (VON BAEYER and VILLIGER), A., i, 622.
- iso*-Propylhydroxyglutaric acid (FITTIG and WOLFF), A., i, 136.
- Propylic alcohol, action of light on (RICHARDSON and FORTEY), T., 1351; P., 1896, 164.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- normal, action of chlorine on (BROCHET), A., i, 114.
- bromide, magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
- ether, dichloro-, unsymmetrical (BROCHET), A., i, 114.
- unsymmetrical, action of water on (BROCHET), A., i, 114.
- nitrosoferrocyanide (HOFMANN), A., i, 269.
- iso*-Propylic alcohol, action of light on (RICHARDSON and FORTEY), T., 1352; P., 1896, 164.
- heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
- sodium derivative, molecular weight of (BECKMANN and SCHLIEBS), A., i, 124.
- barium sulphate (SPIEGEL), A., i, 332.
- hydrogen sulphate, preparation of (SPIEGEL), A., i, 332.
- Propylia. See Triethylenediamine.
- Propylideneacetic acid. See Pentenoic acids.
- iso*-Propylideneacetone. See Mesityl oxide.
- Propylideneanthranilic acid (NIEMEN-TOWSKI and ORZECOWSKI), A., i, 187.

- iso*-Propylidenefumarylhydrazide (RADENHAUSEN), A., i, 138.
benzylidene derivative of (RADENHAUSEN), A., i, 139.
iso-Propylidenephénylamidoaceto-hydrazide (RADENHAUSEN), A., i, 138.
Propylidenephthalide (BROMBERG), A., i, 579.
Propylmalonic acid, ethylic salt, hydrolysis of (HJELT), A., i, 205.
action of ethylenic bromide on (BISCHOFF), A., i, 129.
sodio-, ethylic salt, action of ethylic α -bromopropionate, α -bromobutyrate, α -bromoisobutyrate and α -bromoisovalerate on (BISCHOFF), A., i, 467.
iso-Propylmalonic acid, alkyl salts of, action of sodium ethoxide and ethylenic bromide on (BENTLEY, HAWORTH, and PERKIN), T., 162.
ethylic salt, rate of formation of (BISCHOFF), A., i, 85.
hydrolysis of (HJELT), A., i, 205, 598.
action of ethylenic bromide on (BISCHOFF), A., i, 129.
sodio-, ethylic salt, action of ethylic α -bromopropionate, α -bromobutyrate, α -bromoisobutyrate, and α -bromoisovalerate on (BISCHOFF), A., i, 467.
action of ethylic β -iodopropionate on (HEINKE and PERKIN), T., 1506; P., 1896, 155; (AUWERS and TITHERLEY), A., i, 643.
Propylmesitylene, synthesis of (TÖHL), A., i, 16.
amino- (TÖHL), A., i, 17.
acetyl derivative of (TÖHL), A., i, 17.
dibromo- (TÖHL), A., i, 17.
nitro- (TÖHL), A., i, 17.
dinitro- (TÖHL), A., i, 17.
Propylmesitylenesulphonamide (TÖHL), A., i, 17.
Propylmesitylenesulphonic acid, salts of (TÖHL), A., i, 17.
Propyl- ψ -nitrole. See Propane, β -nitro- β -nitroso-.
o-iso-Propylphenol. See *o*-Cumenol.
m-iso-Propylphenol. See *m*-Cumenol.
iso-Propylphenylacetic acid, *i*-chloro-, from *d-isopropylphenylglycollic* acid (WALDEN), A., i, 139.
d-chloro- (WALDEN), A., i, 139.
1'-Propylphthalazine, 4'-chloro- (BROMBERG), A., i, 580.
1'-Propylphthalazone (BROMBERG), A., i, 579.
1'-Propylphthalimidine (BROMBERG), A., i, 579.
1-Propylpiperidine, γ -bromo-, hydrobromide of (GABRIEL and STELZNER), A., i, 703.
 γ -chloro-, hydrochloride of (GABRIEL and STELZNER), A., i, 703.
 α -*iso*-Propylpropionic- $\alpha\alpha\alpha$ -tricarboxylic acid. See Hexanetricarboxylic acids.
2-Propylpyridine. See Conyrine.
iso-Propylquinol (BAYRAC), A., i, 606.
3'-Propylisoquinoline and its salts (ALBAHARY), A., i, 699.
1'-chloro-, and its salts (ALBAHARY), A., i, 699.
iso-Propylquinone (BAYRAC), A., i, 606.
iso-Propylsuccinic acid. See Pimelic acid.
Propylsuccinimide, velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.
2-Propyltetrahydropyridine. See γ -Conicine.
Propylthiocarbimide, $\beta\gamma$ -*dibromo*- (DIXON), T., 17; P., 1895, 215.
action of alcoholic ammonia on (DIXON), T., 18, 22; P., 1895, 215, 216.
action of aniline on (DIXON), T., 17.
action of organic bases on (DIXON), T., 26; P., 1895, 216.
action of methylic, ethylic, and propylic alcohols on (DIXON), T., 31—33; P., 1895, 217.
action of methylamine on (DIXON), T., 854; P., 1896, 100.
action of silver chloride on (DIXON), T., 20; P., 1895, 215.
Propylthiourea, *dibromo*- (DIXON), T., 18, 23; P., 1895, 215.
 α -Propylvaleric acid. See Octoic acids.
Propylvalerolactone. See Octolactone.
iso-Propylvalerolactone. See Octolactone.
Propyroin. See Ethyl α -hydroxypropyl ketone.
Protamine (KOSSEL), A., i, 582.
Protea mellifera, constituents of (HESSE), A., i, 495.
Proteacin. See Leucodrin.
Proteic acid and its lead salt (HESSE), A., i, 496.
Proteic acid, nature of (PAAL and SCHILLING), A., i, 399.
Proteid from malt (OSBORNE and CAMPBELL), A., i, 715.
from plant-seeds (SCHULZE and WINTERSTEIN), A., i, 516.
from white of egg by action of formaldehyde (BLUM), A., i, 659.

Proteids, formation of, in plants from different organic compounds (LOEW), A., ii, 56.
 formation of, from asparagine in plants (KINOSHITA), A., ii, 54.
 formation of, and of carbohydrates in plants (SAPOSCHNIKOFF), A., ii, 537.
 of the almond, peach-kernel, walnut, and other plants (OSBORNE and CAMPBELL), A., i, 715.
 of barley (OSBORNE), A., i, 455.
 of cotton seeds (OSBORNE and VORHEES), A., ii, 210.
 of grain (RITTHAUSEN), A., i, 716.
 of hops (BEHRENS), A., ii, 207.
 of the kidney-bean (OSBORNE), A., i, 454.
 of malt (OSBORNE and CAMPBELL), A., i, 714.
 of peas and vetches (OSBORNE and CAMPBELL), A., i, 715.
 of the potato (OSBORNE and CAMPBELL), A., i, 715.
 of rye meal (OSBORNE), A., i, 399.
 from wheat meal, rye meal, barley meal, oat meal, maize meal (KJELDAHL), A., i, 583.
 of muscle-plasma (VON FÜRTH), A., ii, 48.
 of urine (MÖRNER), A., ii, 120.
 action of nitrous acid on (LANDSTEINER), A., i, 584.
 amount of arginine formed from various (HEDIN), A., i, 194.
 absorption of, from the small intestine (FRIEDLÄNDER), A., ii, 536.
 metabolism, influence of muscular work on (KRUMMACHER), A., ii, 377.
 feeding experiments with, on sheep (LEHMANN), A., ii, 262.
 vegetable, constitution of (FLEURENT), A., i, 112.
 amount of nitrogen as, in nodules (STOKLASA), A., ii, 205.
 poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.
 colour detections of (LANDSTEINER), A., ii, 284.
 colour detection of, with nitrous acid and phenols (LANDSTEINER), A., ii, 284.
 separation of, in beerwort (SCHJERNING), A., ii, 631.
 Proteids. See also:—
 Abrin.
 Albumin.
 Albumin, egg-.
 Albumose.
 Amandin.
 Avenalin.

Proteids. See:—

Bynedestin.
 Bynin.
 Casein.
 Caseinogen.
 Conglutin.
 Corylin.
 Deamidoalbumin.
 Deamidoglutininpeptone.
 Deamidopropeptone.
 Deamidopeptone.
 Denuclein.
 Deuteroproteose.
 Edestin.
 Exeelsin.
 Gelatin.
 Gliadin.
 Globulin.
 Globulin from malt.
 Glutin peptones.
 Gorgonin.
 Heteroproteose.
 Hordein.
 Legumin.
 Leucinimide.
 Leucosin.
 Myoproteid.
 Peptones.
 Phasclin.
 Phaseolin.
 Phycocyanin.
 Propeptone.
 Proteose.
 Protoproteose from malt.
 Ricin.
 Serum albumin.
 Tuberin.
 Vitellin.
 Protein substance, presence of, as a reserve material in plants (LOEW), A., ii, 58.
 Proteose in barley (OSBORNE), A., i, 455.
 in the pea and vetch (OSBORNE and CAMPBELL), A., i, 715.
 presence of two forms of, in diastase (OSBORNE), A., i, 399.
 Deuteroproteose from malt (OSBORNE and CAMPBELL), A., i, 714.
 Heteroproteose from malt (OSBORNE and CAMPBELL), A., i, 714.
 Protoproteose from malt (OSBORNE and CAMPBELL), A., i, 714.
 Proteosomes, formation of, in partly dead leaves (DAIKUHARA), A., ii, 55.
 connection of, with active albumin (LOEW), A., ii, 59.
 action of ammonia on (LOEW), A., ii, 58.
 detection of, in plants (LOEW), A., ii, 58.

- Proteus vulgaris*, inversion of cane sugar by (FERMI and MONTESANO), A., ii, 493.
- Protexin. See Leucodrin.
- Protocatechuic acid, oxidation of (BERTRAND), A., i, 534.
- bromo-, oxidation of (ZINCKE), A., i, 308.
- Protocatechuic aldehyde; its phenylhydrazones and oxime (WEGSCHEIDER), A., i, 612.
- Protogelatin, conversion of gelatin into (DASTRE and FLORESCO), A., i, 196.
- Protophysechydron, formula of (HESSE), A., i, 60.
- Protoprotose. See Protose.
- Proustite from New South Wales (LIVERSIDGE), A., ii, 658.
- Prunus pissardi*, dyes of (WEIGERT), A., i, 388.
- Pseudobrookite from Transylvania (FRENZEL), A., ii, 112.
- Psoromic acid in lichens, occurrence of (ZOPF), A., i, 104.
- Ptelea trifoliata*, arginine in (SCHULZE), A., ii, 383.
- Ptyalin, solubility of, in alcohol (DASTRE), A., i, 398.
- Pulegenic acid, ammonium salt, amide, nitrile, and hydrochloride of the methylic salt (WALLACH), A., i, 310.
- Pulegenonitrile (WALLACH), A., i, 310.
- base obtained by the reduction of, and its carbamide (WALLACH), A., i, 310.
- iso-Pulegol (TIEMANN and SCHMIDT), A., i, 383.
- Pulegone, constitution of (WALLACH), A., i, 310.
- 2-chloro- (VON BAEYER), A., i, 445.
- bisnitroso- (VON BAEYER), A., i, 445.
- isonitroso- (VON BAEYER), A., i, 445.
- iso-Pulegone, oximes and semicarbazone from (TIEMANN and SCHMIDT), A., i, 383.
- Pulegoncamine and its hydrochloride, carbamide, and phenylcarbamide (WALLACH), A., i, 310.
- Pulegonedinitrosylic acid (VON BAEYER), A., i, 445.
- Pulegonedioximehydrate (VON BAEYER), A., i, 445.
- Pumpkin-seed cake. See Agricultural chemistry (Appendix).
- Pump, simple form of force (KREIDER), A., ii, 161.
- Purpurin, detection of, in wines (BELAR), A., ii, 630.
- Purpuroxanthin, acid compound of (PERKIN), T., 1441; P., 1896, 167.
- Pyrrargyrite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- Pyrazole (CURTIUS), A., i, 339.
- Pyrazole series, isomerism in the (KNORR), A., i, 321.
- Pyrazoline, action of bromine on (CURTIUS), A., i, 339.
- Pyrazolone and its hydrochloride and sodium salt (KNORR), A., i, 260.
- 4-oxime and its silver salt (KNORR), A., i, 260.
- phenylhydrazone and *p*-tolylhydrazone of (KNORR), A., i, 260.
- 5-Pyrazolone-3-carboxylic acid (RUHEMANN), T., 1396.
- ethylic salt (RUHEMANN), T., 1394; P., 1896, 166.
- Pyrrhydrindone, tetrachloro- (ZINCKE and WIEDERHOLD), A., i, 502.
- Pyridine, constitution of (HOFMANN LECTURE), T., 723.
- magnetic rotatory power, &c., of (PERKIN), T., 1115, 1214, 1245.
- action of iodine on (PRESCOTT and TROWBRIDGE), A., i, 186.
- Pyridine cobaltous chloride (REIZENSTEIN), A., i, 316.
- tetraiodide (PRESCOTT and TROWBRIDGE), A., i, 186.
- hydrogen pentiodide (PRESCOTT and TROWBRIDGE), A., i, 186.
- mercuric hydroxide (PESCI), A., i, 388.
- nitrate (PESCI), A., i, 388.
- sulphate (PESCI), A., i, 388.
- mercurochloride (PESCI), A., i, 388.
- nickelous chloride (REIZENSTEIN), A., i, 316.
- peculiar platinochlorides of (WERNER), A., i, 464.
- Pyridine ethiodide (PRESCOTT), A., i, 316.
- ethyl triiodide (PRESCOTT and TROWBRIDGE), A., i, 186.
- methiodide (PRESCOTT), A., i, 316.
- action of iodine on (PRESCOTT and TROWBRIDGE), A., i, 186.
- methyl di-, tri-, and pent-iodide (PRESCOTT and TROWBRIDGE), A., i, 186.
- propiodide (PRESCOTT), A., i, 316.
- isopropiodide (PRESCOTT), A., i, 316.
- derivative of bromo- ψ -cumenol and its hydrobromide. See Pseudocumenol.
- from casein (COHN), A., i, 658.

- Pyridine, dibromo-, preparation of (HOFMANN LECTURE), T., 723.
 tribromo-, formation of, by oxidation of tetrabromotropinine (WILLSTÄTTER), A., i, 709.
- Pyridineacetone, chloride and phenylhydrazide of (KNUTTEL), A., i, 497.
- Pyridineacetoxime, chloride of: its platinochloride and aurochloride (KNUTTEL), A., i, 497.
 acetyl derivative of: its platinochloride and aurochloride (KNUTTEL), A., i, 497.
- Pyridine-3:4-dicarboxylic acid. See Cinchomeronic acid.
- Pyridine-3-sulphonic acid, preparation of, from pyridine (WEIDEL and MURMANN), A., i, 104.
- Pyrimidone, $\alpha\beta$ -dichloro- (ZINCKE and WEIDERHOLD), A., i, 501.
- Pyrites, nickeliferous, from Sudbury, Canada (GOODWIN), A., ii, 109.
- Pyrites. See Iron pyrites.
- Pyroamaric acid. See $\beta\gamma$ -Diphenylbutyric acid.
- Pyroaurite from Nordmark, Sweden (SJÖGREN), A., ii, 110.
- Pyrochlore from the Urals (CHRUSTSCHOFF), A., ii, 567.
- Pyrocatechin. See Catechol.
- Pyrocinchonic acid. See Dimethylmaleic acid.
- Pyrogallol, magnetic rotatory power, &c., of (PERKIN), T., 1127, 1185, 1240.
 barium salt of (GODEFFROY), A., i, 357.
 trichloro-, and its triacetate (BIÉTRIX), A., i, 651.
- Pyrolevulinic acid (RAYMANN and ŠULC), A., i, 459.
 action of sulphuric acid on (RAYMANN and ŠULC), A., i, 459.
- Pyromeride from Jersey, spherulites and matrix of (HYNDMAN and BONNEY), A., ii, 614.
- Pyrotartaramide, action of potassium hypobromite on (WEIDEL and ROITHNER), A., i, 470.
- Pyrotartaric acid (*methylsuccinic acid*), specific refractive power of (LADENBURG), A., i, 464.
- Pyrotartaric anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.
 magnetic rotatory power and relative density of (PERKIN), T., 1063, 1173, 1237.
 reduction products of (FICHTER and HERBRAND), A., i, 463.
- Pyrotartaric nitrile (EULER), A., i, 145.
- Pyrotartarimide (*methylsuccinimide*), velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.
- Pyrotartaronaphthil (BOETTINGER), A., i, 443.
- Pyrotartaryl- α -naphthalide (BOETTINGER), A., i, 443.
- Pyroxanthine, dibromo-, tetrabromide of (VORLÄNDER and HOBOM), A., i, 604.
- Pyroxene. See Augite.
- Pyrrhoarsenite (SJÖGREN), A., ii, 113.
- Pyrrhotite from Hungary (PÁLFFY), A., ii, 657.
 after cuprite from Russia (JERMÉEFF), A., ii, 566.
 artificial (BUCCA), A., ii, 306.
 magnetic behaviour of (ABT), A., ii, 656.
 nickeliferous, from Canada (HOFFMANN), A., ii, 191.
 estimation of, in pyrites (CONE), A., ii, 543.
- Pyroline, isolation of, from coal-tar (HOFMANN LECTURE), T., 597.
- Pyruvic acid, condensation of, with paraformaldehyde (KALTWASSER), A., i, 670.
 benzoyl derivative of hydrazone of (VON PECHMANN), A., i, 680.
- Pyruvic acid, allylic salt, action of aniline and phenylhydrazine on (SIMON), A., i, 85, 86.
 amylic salt, condensation product of, with aniline (SIMON), A., i, 86.
 active amylic salt, action of aniline on (SIMON), A., i, 85.
 isoamylic salt, preparation and phenylhydrazine of (SIMON), A., i, 86.
 action of aniline on (SIMON), A., i, 85.
 condensation of, with aniline and *p*-toluidine (SIMON), A., i, 86.
 benzylic salt and its phenylhydrazone (SIMON), A., i, 86.
 action of aniline on (SIMON), A., i, 85, 86.
 ethylic salt, action of aniline and *p*-toluidine on (SIMON), A., i, 85.
 action of ethylic β -bromisovalerate on (PERKIN and THORPE), P., 1896, 156.
- para-Pyruvic acid (MULDER), A., i, 281.
- Pyruvic- β -naphthil (GASSMANN), A., i, 487.

Q.

- Quartz in gypsum from Jena (ZSCHIMMER), A., ii, 528.
 colour of (WEINSCHENK), A., ii, 654.
 separation of, from other varieties of silica (LUNGE), A., ii, 275.
- Quartz-keratophyre from Wisconsin (WEIDMANN), A., ii, 314.
- Quassin, quassole from (MERCK), A., i, 59.
- Quassole from quassin (MERCK), A., i, 59.
- Querbracho colorado*, the colouring matter and other constituents of (PERKIN and GUNNELL), T., 1303; P., 1896, 158.
- Quercetin, colouring matter of *Crataegus oxyacantha* (PERKIN and HUMMEL), T., 1570; P., 1896, 186.
 existence of, in *Cheiranthus cheiri* (PERKIN and HUMMEL), T., 1568; P., 1896, 185.
 occurrence of, in outer skins of the bulb of the onion (PERKIN and HUMMEL), T., 1295; P., 1896, 144.
 constitution of acid compounds of (PERKIN), T., 1444; P., 1896, 167.
- Quercetin hydrochloride, analysis of (PERKIN), T., 1441; P., 1896, 167.
 monomethyl ether, existence of isorhametin, in *Cheiranthus cheiri*, and its acetyl derivatives (PERKIN and HUMMEL), T., 1569; P., 1896, 186.
 tetramethyl ether, acid compound of (PERKIN), T., 1443; P., 1896, 167.
- Quercetin, dibromo-, non-formation of acid compounds of (PERKIN), T., 1443; P., 1896, 167.
- Quercetin-group of natural yellow colouring matters (PERKIN), T., 1441; P., 1896, 167.
 means of distinguishing members of, of natural yellow dye-stuffs (PERKIN), T., 1445; P., 1896, 168.
- Quercitol, action of bromine water on (KILIANI and SCHÄFER), A., i, 586.
 oxidation of, with potassium permanganate and nitric acid (KILIANI and SCHÄFER), A., i, 586.
- Quinacridine (NIEMENTOWSKI), A., i, 261.
 probable isomeride of (NIEMENTOWSKI), A., i, 261.
- Quinaldine. See 2'-Methylquinoline.
- Quinazoline, 2'-chloro- (GABRIEL and STELZNER), A., i, 507.
 4'-chloro- (GABRIEL and STELZNER), A., i, 507.
- Quinenine (*chinine*), hydrolytic decomposition of (KOENIGS), A., i, 63.
- Quinethoil. See 3-Ethoxyquinoline.
- Quininamide and its salts (HIRSCH), A., i, 626.
- Quinine, attempts to synthesise (HOFMANN LECTURE), T., 603; P., 1893, 138.
 basicity of, and behaviour of salts of, to various indicators (SALOMONSON), A., i, 450.
 action of phosphorus pentachloride on (KOENIGS), A., i, 328.
 as a developer (ACKERMANN), A., i, 513.
 reduction of (LIPPMANN and FLEISSNER), A., i, 63.
- Quinine chlorohydrosulphate, nature of (GEORGES), A., i, 655.
 sulphate, examination of (HESSE), A., ii, 550.
- Quinine, detection of (CARREZ), A., ii, 584.
 examination of (KUBLI), A., ii, 550.
 estimation of, volumetrically (SALOMONSON), A., i, 450; (ALLEN), A., ii, 584.
 titration of, by iodine (KIPPENBERGER), A., ii, 682.
- Quininic acid, ethylic salt of (HIRSCH), A., i, 626.
- Quinol, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
 potassium derivatives of (ASTRE), A., i, 18.
 dithio-, preparation of (SNAPE), T., 100.
- Quinoldiantipyrine. (PATEIN and DUFAY), A., i, 188.
- Quinolphtalein: its imido-compound and dibenzoate (R. and H. MEYER), A., i, 174.
- Quinoline, isolation of, from coal-tar (HOFMANN LECTURE), T., 597.
 magnetic rotatory power, &c., of (PERKIN), T., 1115, 1117, 1214, 1245.
 action of cyanogen on (HOFMANN LECTURE), T., 650.
- Quinoline cobaltous chloride (REIZENSTEIN), A., i, 316.
 mercuric hydroxide and salts (PESCI), A., i, 186, 187.
 preparation of derivatives of (KNUERPEL), A., i, 391.

- Quinoline, 1-amino-, and its acetyl derivative (CLAUS and SETZER), A., i, 498.
- 3-amino-, and its methiodide and acetyl and benzoyl derivatives (CLAUS and SCHNELL), A., i, 320.
- 4-amino-, and its acetyl derivative (CLAUS and SETZER), A., i, 498.
- 2 : 4-*di*amino-, and its salts (CLAUS and DEWITZ), A., i, 654.
- 2 : 3-*di*bromo-, and its platinochloride and methiodide (CLAUS), A., i, 254.
- 3 : 4-*di*bromo-, and its platinochloride and methiodide (CLAUS), A., i, 254.
- 1 : 2 : 3-*tri*bromo-, and its hydrochloride and platinochloride (CLAUS), A., i, 254.
- 2 : 3 : 4-*tri*bromo- (CLAUS), A., i, 255.
- 2 : 3 : 3'-*tri*bromo-, and its platinochloride and methiodide (CLAUS), A., i, 255.
- 3 : 4 : 3'-*tri*bromo-, and its platinochloride (CLAUS), A., i, 254.
- 2 : 3-bromamino- (CLAUS and SCHNELL), A., i, 320.
- 4 : 1-bromamino-, acetyl derivative of (CLAUS and SETZER), A., i, 498.
- 3 : 3'-bromamino- (CLAUS and SCHNELL), A., i, 319.
- 2 : 3-*di*bromamino- (CLAUS), A., i, 254.
- 2 : 4 : 1-*di*bromamino- (CLAUS and SETZER), A., i, 498.
- di*bromo-3-amino- (CLAUS and SCHNELL), A., i, 320.
- 4 : 3' : 3-*di*bromamino-, and its hydrobromide (CLAUS and SCHNELL), A., i, 320.
- 1 : 3 : 4-*di*bromamino- (CLAUS and SETZER), A., i, 498.
- 2 : 3 : 4-*di*bromamino- (CLAUS), A., i, 255.
- 3' : 3-bromonitro-, and its methiodide (CLAUS and SCHNELL), A., i, 319.
- 3' : 1 : 3-bromodinitro- (CLAUS and HARTMANN), A., i, 392.
- 3' : 1 : 4-bromodinitro- (CLAUS and HARTMANN), A., i, 391.
- 3' : 2 : 4-bromodinitro- (CLAUS and HARTMANN), A., i, 392.
- 2 : 3 : 1-*di*bromonitro-, and its platinochloride (CLAUS), A., i, 254.
- 2 : 3 : 4-*di*bromonitro-, and its methiodide and platinochloride (CLAUS), A., i, 255.
- 3 : 4 : 1-*di*bromonitro-, and its platinochloride (CLAUS), A., i, 254.
- 2' : 4-chloronitro- (CLAUS and SETZER), A., i, 498.
- Quinoline, 1-nitro-, preparation of (CLAUS and SETZER), A., i, 498.
- 3-nitro-, hydrobromide and dibromide (CLAUS and SCHNELL), A., i, 319.
- 4-nitro-, preparation of (CLAUS and SETZER), A., i, 498.
- 1 : 3-*di*nitro- (CLAUS and HARTMANN), A., i, 392.
- 1 : 4-*di*nitro-, and its hydrobromide (CLAUS and HARTMANN), A., i, 391.
- 2 : 4-*di*nitro-, and its hydrochloride and platinochloride (CLAUS and HARTMANN), A., i, 392.
- 3 : 1-nitramino-, and its methiodide and platinochloride (CLAUS and HARTMANN), A., i, 392.
- 4 : 1-nitramino-, and its methiodide and platinochloride (CLAUS and HARTMANN), A., i, 391.
- 2 : 4 : 1-*di*nitramino- (CLAUS and DEWITZ), A., i, 654.
- iso*-Quinoline, α -iodo-, and its methiodide, platinochloride, dichromate, and picrate (EDINGER), A., i, 502.
- Quinoline-red, preparation of (HOFMANN LECTURE), T., 627.
- Quinoline-blue, composition of (HOFMANN LECTURE), T., 619.
- Quinolinephenazine, 1 : 2-*di*chloro- (ZINCKE and WIEDERHOLD), A., i, 502.
- 2 : 4-Quinolinequinone, 1 : 2-*di*chloro-, and its hydrochloride (ZINCKE and WIEDERHOLD), A., i, 501.
- 2'-Quinolylacetic acid and its platinochloride (EINHORN and SHERMAN), A., i, 61.
- methylic and ethylic salts of (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinolylacrylamide (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinonylaerylic acid (EINHORN and SHERMAN), A., i, 61.
- ethylic salt of (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinolyglyceric acid and its aurochloride (EINHORN and SHERMAN), A., i, 61.
- ethylic and methylic salt of (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinolypropionamide (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinolypropionic acid and its platinochloride (EINHORN and SHERMAN), A., i, 61.
- 2'-Quinolypropylic alcohol (EINHORN and SHERMAN), A., i, 61.
- Quinone, preparation of (HOFMANN LECTURE), T., 700.
- action of potassium hydroxide and ethoxide on (ASTRE), A., i, 153.

- Quinone, behaviour of, towards phenylhydrazine (McPHERSON), A., i, 28.
 condensation of, with thiophenol (TROEGER and EGGERT), A., i, 562.
 potassium derivatives of (ASTRE), A., i, 18.
 potassium hexoxide (ASTRE), A., i, 154.
 dipotassium hexoxide (ASTRE), A., i, 154.
 Quinone, *tetrachloro*-. See Chloranil.
hexachloro-. (BARRAL), A., i, 91.
 Quinonedimalonic acid, *diechloro*-, ethylic salt of (JACKSON and GRINDLEY), A., i, 19.
 Quinonedinaphthylhemiacetal and its sodium salt (JACKSON and OENSLAGER), A., i, 294.
 Quinonemonophenylbenzoylhydrazone, constitution, hydrolysis, and reduction of (McPHERSON), A., i, 28.
 Quinoneoxime, effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
o-Quinonedioxime (*benzene-o-dioxime*), and its anhydride (ZINCKE), A., i, 430.
 Quinones, list of. See Ketones.
 Quinonoid derivatives (ZINCKE), A., i, 214.
 Quinoxaline, 2':3'-*diechloro*-. (HINSBERG and POLLAK), A., i, 394.
 Quinoxalophenazine and its sulphate (HINSBERG and POLLAK), A., i, 394.
 Quiroguite from Spain (NAVARRO), A., ii, 430.

R.

- Racemic acid. See Tartaric acids.
 Racemic compounds, theory of (WINTHER), A., ii, 140.
 Racemism (TRAUBE), A., i, 526.
 Raffinose, action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
 Rape seeds, effect of chemical substances on germination of (SIGMUND), A., ii, 441.
 Rapic acid, non-identity of, with oleic acid (ZELLNER), A., i, 593.
 action of phosphorus triiodide on (ZELLNER), A., i, 592.
 Rate of chemical change. See Velocity.
 Rathite from the Binnenthal (BAUMHAUER), A., ii, 659.
 Reaction of oxygen and hydrogen, conditions regulating the (GAUTIER and HÉLIER), A., ii, 416.
 between hydrogen peroxide and hydriodic acid, velocity under varying conditions of the (HARCOURT and ESSON), A., ii, 238.
 Reaction of the first order, a reversible (KÜSTER), A., ii, 158.
 Reactions of the first order (intramolecular changes in oximes) (LEY), A., ii, 243.
 of the second order (decomposition of acidimides by acids) (MIOLATI), A., ii, 242.
 brought about by light (NAMIAS), A., ii, 459.
 in gases, explanation of abnormal (STORCH), A., ii, 296.
 polymolecular, acceleration of, by acids (NOYES), A., ii, 470.
 determination of the order of (NOYES and SCOTT), A., ii, 158.
 Reactions, mixer for accelerating (MARKOWNIKOFF), A., ii, 297.
 Refractive power. See Light.
 Refractometer. See Light.
 Rennin, action of (EDMUNDS), A., ii, 489.
 presence of, in different parts of the body (EDMUNDS), A., ii, 489.
 Resacetophenone, constitution of (GREGOR), A., i, 44.
 ethyl ether (KOSTANECKI and TAMBOR), A., i, 44.
 diethyl ether (KOSTANECKI and TAMBOR), A., i, 44.
 Resacetophenone, bromo- (FRIEDLÄNDER and RÜDT), A., i, 607.
Reseda luteola, luteolin, the colouring matter of (PERKIN), T., 206; P., 1896, 37.
 Resens (BAUR), A., i, 57.
 Resin. See Rosin (*colophony*).
 Resin, jalap, estimation of (SPAETH), A., ii, 508.
 Resin from Sagapen (HOHENADEL), A., i, 58.
 Resin, sandarac, constituents of (BALZER), A., i, 493.
 Resins from Mecca balsam (BAUR), A., i, 58.
 Resoreinol, magnetic rotatory power, &c., of (PERKIN), T., 1084, 1127, 1130, 1239.
 heat of solution of, in water and ethylic alcohol (SPEYERS), A., ii, 411.
 freezing points of dilute solutions of (WILDERMANN), A., ii, 351.
 Resoreinol in red grapes (SESTEGNI), A., ii, 123.
 effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
 action of, on ammonium hydrogen-*o*-sulpho-*p*-toluate (JONES), A., i, 50.

- Resorcinol, condensation of, with chloral (HEWITT and POPE), T., 1265; 1896, 150.
- condensation of, with chloral hydrate (HEWITT and POPE), T., 1266; P., 1896, 150.
- condensation of, with phthalic chloride (PAWLEWSKI), A., i, 50.
- Resorcinol, dibromo-, diethyl ether (JACKSON and DUNLAP), A., i, 355.
- tribromo- (JACKSON and DUNLAP), A., i, 356.
- diethyl ether (JACKSON and DUNLAP), A., i, 355, 356.
- sodium derivative of (JACKSON and DUNLAP), A., i, 355.
- bromodinitro- (JACKSON and DUNLAP), A., i, 355.
- tribromonitro-, diacetate (JACKSON and DUNLAP), A., i, 355.
- diethyl ether (JACKSON and CALVERT), A., i, 473.
- trichloro-, action of phosphorus pentachloride on (ZAHARIA), A., i, 646.
- compound of, with nitrosodimethylaniline. See Dimethylaniline.
- dinitro-, diethyl ether (JACKSON and DUNLAP), A., i, 355.
- trinitro- (HOHENADEL), A., i, 58.
- behaviour of ethyl ether of, towards hydrazine hydrate (PURGOTTI), A., i, 363.
- dioxime, effect of, on the freezing points of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
- oxime, effect of, on the freezing points of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 475.
- thio- (VOSWINKEL), A., i, 379.
- dithio-, preparation of (SNAPE), T., 100.
- Resorcinolantipyrine (PATEIN and DUFAY), A., i, 188.
- Respiration, cutaneous, in the frog (REID), A., ii, 42.
- of certain plants (ZIEGENBEIN), A., ii, 265.
- of plants, effect of abundant application of nitrogen on (MÜLLER), A., ii, 54.
- of seeds, influence of laccase on (REY-PAILHADE), A., ii, 327.
- respiratory exchange of inhabitants of the tropics (EIJKMAN), A., ii, 661.
- in marine invertebrates (VERNON), A., ii, 195.
- respiratory movements, relation of blood-gases to (FILEHNE and KIONKA), A., ii, 118.
- Retene, fluorescence of gaseous (WIEDEMANN and SCHMIDT), A., ii, 86.
- Retzian from Nordmark, Sweden (SJÖGREN), A., ii, 35.
- Reuniol, identity of, with rhodinol (ERDMANN and HUTH), A., i, 198.
- individuality of (HESS), A., i, 382.
- Rhamnazin, acid compound of (PERKIN), T., 1441; P., 1896, 167.
- iso-Rhamnetin, the yellow colouring matter in *Cheiranthus cheiri* (PERKIN and HUMMEL), T., 1569; P., 1896, 186.
- Rhamnohexonic acid (FISCHER), A., i, 526.
- iso-Rhamnolactone, oxidation of (FISCHER and HERBORN), A., i, 587.
- Rhammonic acid, action of pyridine on (FISCHER and HERBORN), A., i, 587.
- oxidation of (FISCHER and HERBORN), A., i, 588.
- brucine salt (FISCHER and HERBORN), A., i, 587.
- iso-Rhammonic acid (FISCHER and HERBORN), A., i, 587.
- phenylhydrazide (FISCHER and HERBORN), A., i, 587.
- brucine salt (FISCHER and HERBORN), A., i, 587.
- lactone of, reduction of (FISCHER and HERBORN), A., i, 587.
- Rhamnosamine methylic alcoholate (DE BRUYN and VAN LEENT), A., i, 119.
- Rhamnose, crystallised anhydrous (FISCHER), A., i, 272, 273.
- rotatory power of dissolved and super-fused (GERNEZ), A., ii, 287.
- oxidation of (FISCHER and HERBORN), A., i, 588.
- action of bromine water on (FISCHER and HERBORN), A., i, 587.
- Rhamnose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Rhamnose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Rhamnose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Rhamnosebenzylmercaptal (LAWRENCE), A., i, 272.
- Rhamnose-ethylenemercaptal (LAWRENCE), A., i, 272.
- Rhamnose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Rhamnosnaphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.

- iso*-Rhamnose (FISCHER and HERBORN), A., i, 587.
 action of dilute hydrochloric acid on (FISCHER and HERBORN), A., i, 588.
 action of hydrogen cyanide on (FISCHER and HERBORN), A., i, 588.
 phenylhydrazone and osazone of (FISCHER and HERBORN), A., i, 588.
- iso*-Rhamnose-ethylmercaptal (FISCHER and HERBORN), A., i, 588.
- Rhodamine obtained from hemimellitic anhydride and *m*-dimethylamino-phenol (GRAEBE and LEONHARDT), A., i, 438.
- Rhodinaldehyde (BARBIER and BOUVEAULT), A., i, 446
 constitution of (BARBIER and BOUVEAULT), A., i, 492.
 semicarbazone, and oxime of (BARBIER and BOUVEAULT), A., i, 491.
- Rhodinaldoxime, conversion of, into menthoneoxime (BARBIER and BOUVEAULT), A., i, 491.
- Rhodinic acid: its rhodinylic salt (BARBIER and BOUVEAULT), A., i, 446.
- Rhodinol, identity of, with citronellol (TIEMANN and SCHMIDT), A., i, 384.
 oxidation of and constitution of (TIEMANN and SCHMIDT), A., i, 384;
 (BARBIER and BOUVEAULT), A., i, 446.
 acetate (BARBIER and BOUVEAULT), A., i, 446.
 action of dibasic acids on (ERDMANN and HUTH), A., i, 198.
 compound of, with camphoric acid (ERDMANN and HUTH), A., i, 198.
 diphenylurethane (ERDMANN and HUTH), A., i, 198.
- Rhodium, rate of diffusion of, through lead (ROBERTS-AUSTEN), A., ii, 592.
 solubility of carbon in (MOISSAN), A., ii, 609.
- Rhodophosphite from Sweden (IGELSTRÖM), A., ii, 308.
- Rhodusite from Bosnia (FOULLON), A., ii, 483.
- Rhubarb stems and wine, amount of acid in (OTTO), A., ii, 539.
- Rhus coriaria*, the colouring matter of (PERKIN and ALLEN), T., 1299; P., 1896, 157.
typhina, red dye of (WEIGERT), A., i, 388.
- Rhyolite from Jersey, spherulites and matrix of (HYNDMAN and BONNEY), A., ii, 614.
- Rice imported into France, composition of (BALLAND), A., ii, 212.
- Richterite (SJÖGREN), A., ii, 115.
- Ricin, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.
- Ricinin, preparation of (SOAVE), A., i, 386.
 detection of (SOAVE), A., i, 386.
- Ricinin, bromo- (SOAVE), A., i, 387.
 chloro- (SOAVE), A., i, 387.
- Ricininic acid and salts (SOAVE), A., i, 387.
 bromo- (SOAVE), A., i, 387.
- Ricinus communis*, edestin, the proteid in (OSBORNE and CAMPBELL), A., i, 716.
- Rickets, elimination of calcium and magnesium in (DE KONINCK), A., ii, 50.
- Riebeckite from Ireland (SOLLAS), A., ii, 310.
- Ring compounds, nomenclature of (RICHTER), A., i, 349.
- Röntgen rays. See Light.
- Rosaniline (VON GEORGIEVICS), A., i, 442.
 discovery of (HOFMANN LECTURE), T., 609; P., 1893, 138.
 constitution of (HOFMANN LECTURE), T., 613, 689.
 coloured base of (VON GEORGIEVICS), A., i, 690.
 action of alkyl iodides on (HOFMANN LECTURE), T., 616.
 detection of, in wines (BELAR), A., ii, 630.
 Magenta, distinction of, from "acid magenta" (CAZENEUVE), A., ii, 630.
- p*-Rosaniline, colourless and coloured forms of (VON GEORGIEVICS), A., i, 441.
- Rosaniline dyes, action of sunlight on (OGLOBIN), A., i, 649.
- Rosanilines, acid (PRUD'HOMME), A., i, 376.
- Roscine. See Rosaniline.
- Rosemary oil, analysis of (HIRSCHSOHN), A., ii, 223.
- Roses, oil of (BARBIER and BOUVEAULT), A., i, 446.
 composition of (BERTRAM and GILDEMEISTER), A., i, 381.
- Rosin (*colophony*), detection of, in guaiacum resin, tolu balsam, and copaiba balsam (HIRSCHSOHN), A., ii, 508.
- Rosin oil, estimation of, in mineral oil (KLIMONT), A., ii, 224.
- Rosinduline, acetyl derivative of (KEHRMANN and HERTZ), A., i, 509.

Rosinduline, carbonate (KEHRMANN and HERTZ), A., i, 509.
 hydroxide, formula of (FISCHER and HEPP), A., i, 323.
 hydrate (KEHRMANN and HERTZ), A., i, 509.
iso-Rosinduline and its hydrochloride, platinochloride, and nitrate (KEHRMANN and HERTZ), A., i, 510.
 hydroxyazonium base of, and its sulphate, chloride, and platinochloride (KEHRMANN and HERTZ), A., i, 510.
 Rosolic acid, detection of, in wines (BELAR), A., ii, 630.
 Rosotoluidine (BARSILOWSKY), A., i, 358.
 Rotation, magnetic. See Light, magnetic rotatory power.
 Rotatory power. See Light.
 Royal College of Chemistry, history of (HOFMANN LECTURE), T., 580.
 Rubidium chlorate, electrolytic conductivity of solutions of (BAUR), A., ii, 144.
 ferrate (MOESER), A., ii, 251.
 permanganate, molecular weight of solid (FOCK), A., ii, 160.
 sulphate, constitution of double salts containing (TUTTON), T., 519; P., 1896, 71.
 cadmium sulphate, density and optical behaviour of (TUTTON), T., 445.
 cobalt sulphate, density and optical behaviour of (TUTTON), T., 424.
 copper sulphate, density and optical behaviour of (TUTTON), T., 437.
 ferrous sulphate, density and optical behaviour of (TUTTON), T., 391.
 magnesium sulphate, density and optical behaviour of (TUTTON), T., 361.
 manganous sulphate, density and optical behaviour of (TUTTON), T., 399.
 nickel sulphate, density and optical behaviour of (TUTTON), T., 411.
 vanadium alum (PICCINI), A., ii, 305.
 zinc sulphate, density and optical behaviour of (TUTTON), T., 379.
 Ruby. See Corundum.
Rumex nepalensis (Wall.), constituents of (HESSE), A., i, 573
 constituents of root of (HESSE), A., i, 315.
 Rumicin (HESSE), A., i, 573.
Russula cyanoxantha and *R. furcata*, oxidising ferment of (BOURQUELOT and BERTRAND), A., ii, 383.
 tyrosinase, the soluble ferment in (BERTRAND), A., ii, 571.

Ruthenium nitrosochloride, action of reducing agents on (BRIZARD), A., ii, 478.
 double salts containing silver and (BRIZARD), A., ii, 566.
 estimation of, electrolytically (SMITH and HARRIS), A., ii, 223.
 Rye, effect of chemical substances on germination of seeds of (SIGMUND), A., ii, 441.
 meal, proteids from (OSBORNE), A., i, 399; (KJELDAHL), A., i, 583.

S.

Saccharic acid, velocity of lactone formation of (HJELT), A., i, 597.
 acid potassium salt, action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
iso-Saccharin, methylene derivative (HENNEBERG and TOLLENS), A., i, 645.
 action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
 Saccharinic acid (DE BRUYN and VAN EKENSTEIN), A., i, 116.
Saccharomyces apiculatus, indifference of, towards cane sugar (FISCHER and LINDNER), A., i, 196.
 reducing power of (NASTUKOFF), A., ii, 202.
cerevisiæ, enzymes in (BAU), A., i, 453.
pastorianus, reducing power of (NASTUKOFF), A., ii, 202.
 Safflorite from Nordmark, Sweden (SJÖGREN), A., ii, 109.
 Safranine, discovery of (HOFMANN LECTURE), T., 625.
 detection of, in wines (BELAR), A., ii, 630.
 Safranines, constitution of (BROMBERG), A., i, 580; (FISCHER), A., i, 628.
 Safranöl, formation of, from phenosafranine (FISCHER and HEPP), A., i, 50.
 Safrole, synthesis and constitution of (MOUREU), A., i, 477.
 α -nitrosite, preparation of (ANGELI), A., i, 295.
iso-Safrole, synthesis of (MELDOLA, WOOLCOTT, and WRAY), T., 1321; (MOUREU), A., i, 477.
 constitution of (MOUREU), A., i, 477.
 nitrosite (ANGELI and RIMINI), A., i, 477.

- iso*-Safrole nitrosite, compound of, with piperidine (ANGELI and RIMINI), A., i, 477.
 compound obtained from, by heating with piperidine (ANGELI and RIMINI), A., i, 477.
- Sagapen (HOHENADEL), A., i, 58.
- Sagaresinotannol and its acetyl and benzoyl derivatives (HOHENADEL), A., i, 58.
- Salicin, hydrolysis of, by acids (NOYES and HALL), A., ii, 159.
 decomposition of, by emulsin (TAMMANN), A., ii, 244.
 detection of (FORMÁNEK), A., ii, 401.
- Salicylaldehyde, condensation of, with acetophenone (BABLICH and KOSTANECKI), A., i, 239.
 magnetic rotatory power, &c., of (PERKIN), T., 1126, 1200, 1243.
 compound of, with aluminium chloride (PERRIER), A., i, 354.
 condensation of, with acetone (CORNELSON and KOSTANECKI), A., i, 240.
 condensation of, with *o*-aminobenzylamine (BUSCH), A., i, 508.
- Salicylamide, decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
 preparation of aniline from (HOFMANN LECTURE), T., 647.
- Salicylic acid (DE CONINCK), A., i, 473.
 in *Polygala* root (SCHNEEGANS), A., ii, 328.
 absorption by silk of dilute (WALKER and APPLEBYARD), T., 1346; P., 1896, 147.
 action of nitrous acid on (LANDSTEINER), A., i, 584.
 compound of, with antipyrine (PATEIN and DUFAU), A., i, 650.
- Salicylic acid, sodium salt, water of crystallisation of (ROMYN), A., i, 550.
 estimation of the sodium salt of, in presence of "ichthyol" (HOFMAN), A., ii, 549.
- Salicylic acid, *p*-acetaminophenyl salt detection of (DRAGENDORFF), A., ii, 280.
 ethylic salt, rotatory power, &c., of (PERKIN), T., 1126, 1127, 1176, 1238.
 melting point of the (v. SCHNEIDER), A., ii, 290.
 molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
 benzoic derivative of (LIMPRICHT), A., i, 435.
- Salicylic acid, guaiacol salt, detection of (DRAGENDORFF), A., ii, 278.
 methylic salt, magnetic rotatory powers, &c., of the (PERKIN), T., 1126, 1127, 1176, 1238.
 compound of, with aluminium chloride (PERRIER), A., i, 354.
 in *Polygala* root (SCHNEEGANS), A., ii, 328.
 α -naphthyl salt, detection of (DRAGENDORFF), A., ii, 279.
 β -naphthyl salt, detection of (DRAGENDORFF), A., ii, 279.
 phenylic salt, compound of, with aluminium chloride (PERRIER), A., i, 354.
 tolylic salts, detection of (DRAGENDORFF), A., ii, 280.
- Salicylic acid, detection of, in beer (SCHOEPP), A., ii, 227.
- Salicylic acid, thio-, methylic salt (VOSWINKEL), A., i, 378.
- Saligenin, compound of, with antipyrine (PATEIN and DUFAU), A., i, 651.
- Saliva of dog and horse, absence of thiocyanates in (MUNK), A., ii, 50.
- Salivary glands, effects of extirpation of (SCHÄFER and MOORE), A., ii, 438.
- Salmine (KOSSEL), A., i, 582.
- Salmon, protamine from spermatzoa of (KOSSEL), A., i, 582.
- Salt deposits of Argentina (SCHICKENDANTZ), A., ii, 480.
- Salts, action of metallic, on the lactic fermentation (CHASSEVANT), A., ii, 122.
 ethereal, action of hydrazine on (CURTIUS), A., i, 339.
 poisonous effect of various, on algae and infusoria (BOKORNY), A., ii, 669.
- Salvadorite from Chili (HERZ), A., ii, 368.
- Samarium group, a new element of the (DEMARÇAY), A., ii, 475.
- Samarskite from the Urals (CHRUST-SCHOFF), A., ii, 567.
- Sandaracolic acid: its salts and acetyl and benzoyl derivatives (BALZER), A., i, 493.
- Sandstone, Berea grit, analyses of (MABERY and DUNN), A., i, 329.
- Santalenic acid (CHAPMAN and BURGESS), P., 1896, 140.
- Santalal, oxidation of (CHAPMAN and BURGESS), P., 1896, 140.
- Santal-wood oil, analysis of (PARRY), A., ii, 400.
- Santonic acid, specific rotation of (ANDREOCCI), A., i, 182.
 mono- and di-acetyl derivatives of (FRANCESCONI), A., i, 377.

- iso*-Santonie acid and its methylic and ethylic salts (FRANCESCONI), A., i, 378.
- meta*-Santonie acid, and its oxime and acetyl derivative (FRANCESCONI), A., i, 378.
- ethylic salt of, and its oxime (FRANCESCONI), A., i, 378.
- Santonide (FRANCESCONI), A., i, 378.
- Santonin, specific rotation of (ANDREOCCI), A., i, 182.
- reduction of (ANDREOCCI), A., i, 183.
- meta*-Santonin (*iso-santonin*) and its oxime (FRANCESCONI), A., i, 377.
- l*-Santonous acid: its methylic and ethylic salts and benzoyl derivative (ANDREOCCI), A., i, 184.
- α -bromo-, and its ethylic salt (ANDREOCCI), A., i, 184.
- sodio-, ethylic salt of (ANDREOCCI), A., i, 184.
- Santonous acid, racemic, methylic and ethylic salts of the benzoyl derivative of (ANDREOCCI), A., i, 184.
- α -bromo-, and its ethylic salt (ANDREOCCI), A., i, 185.
- iso*-Santonous acid, identity of racemic santonous acid and (ANDREOCCI), A., i, 184.
- Santonous acids, fusion of, with potash, and formulæ of (ANDREOCCI), A., i, 185.
- Saps of certain trees, constituent of (HÉBERT), A., ii, 494.
- Sartorite from Binnenthal (BAUMHAUER), A., ii, 109.
- Scamminolic acid (KROMER), A., i, 386.
- Scammonic acid and its salts (KROMER), A., i, 385.
- Scammonin, identity of, with jalapin and properties of (KROMER), A., i, 385.
- Scapolite from Arizona (MOSES), A., ii, 661.
- from Lombardy (SALOMON), A., ii, 433.
- Scheelite from New South Wales (LIVERSIDGE), A., ii, 658.
- from Quebec (HOFFMANN), A., ii, 191.
- Schulzenite from Chili? (MARTENS), A., ii, 529.
- Scilla maritima*, fermentation of (RIVIÈRE and BAILLIACHE), A., ii, 203.
- Scolecite from Colorado (EAKINS), A., ii, 39.
- from Thuringia (FROMME), A., ii, 370.
- Scopolamine, occurrence of (MERCK), A., i, 65.
- nature of (SCHMIDT), A., i, 712.
- Scopolamine and its salts, properties of (LUBOLDT), A., i, 514.
- a new alkaloid in commercial (HESSE), A., i, 656.
- Scopoleine of tropic acid, and its acetyl, benzoyl, and cinnamoyl derivatives (MERCK), A., i, 65.
- Scopolia atropoides*, scopolamine in (MERCK), A., i, 65.
- japonica*, scopolamine in (MERCK), A., i, 65.
- Scopoligenine and its salts and nitroso-derivative (LUBOLDT), A., i, 515.
- Scopoline and its salts (LUBOLDT), A., i, 515.
- Sebacic acid from the oxidation of dehydroundecylenic acid (KRAFFT), A., i, 665.
- Secale. See Agricultural chemistry. (Appendix.)
- Secretion, causes of, in the kidney (TAMMANN), A., ii, 618.
- from trachea, action of drugs on (CALVERT), A., ii, 667.
- Seeds, effect of alkaloids on the germination of (Mosso), A., ii, 326.
- ungueko*, from l'Sano, fatty acids from (HÉBERT), A., i, 638.
- occurrence of philothion and laccase in germinating (REY-PAILHADE), A., ii, 326.
- phosphorised constituent of plant (SCHULZE and WINTERSTEIN), A., i, 516.
- Seelandite from Carinthia (BRUNLECHNER), A., ii, 256.
- Selenanthrene dioxide. See Diphenylene diselenoxide.
- Selenium:—
- Hydrogen selenide, formation and dissociation of (PÉLABON), A., ii, 96.
- heat of formation of (PÉLABON), A., ii, 96.
- action of carbonyl chloride on (BESSON), A., ii, 359.
- Selenic acid, preparation of (METZNER), A., ii, 642.
- reduction of, by hydrochloric acid and by potassium bromide (GOOCH and SCOVILLE; GOOCH and EVANS), A., ii, 125.
- reduction of, by hydriodic acid (GOOCH and REYNOLDS), A., ii, 124.
- estimation of (GOOCH and PEIRCE), A., ii, 334.
- Selenious acid, reduction of, by hydriodic acid (GOOCH and REYNOLDS), A., ii, 124.
- estimation of (GOOCH and PEIRCE), A., ii, 334.

- Selenium, detection of arsenic in the presence of (DAWYDOW), A., ii, 219.
 estimation of, gravimetrically (PEIRCE), A., ii, 673.
- Selenodiacetic acid, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Semianiline. See Phenylenediamine.
- Semicarbazide (CURTIUS), A., i, 340.
 preparation of (THIELE and HEUSER), A., i, 208.
 hydrochloride (CURTIUS and HEIDENREICH), A., i, 143.
- Seminaphthalidine. See Naphthylendiamine.
- Senarmontite from Sardinia (LOVISATO), A., ii, 183.
- Serieite from Bohemia (HIBSCH), A., ii, 534.
 from British Columbia (HOFFMANN), A., ii, 258.
- Serpierite from Laurion (FRENZEL), A., ii, 111.
- Serpentine, origin of (KONINCK), A., ii, 481.
 from Zermatt (ASTON and BONNEY), A., ii, 612.
 after amphibolite from New South Wales (JAQUET), A., ii, 534.
 action of dry hydrogen chloride on (LINDER), A., ii, 369.
 nickel-bearing, from Zermatt (ASTON and BONNEY), A., ii, 611.
- Serum, method of rapidly desiccating (MARTIN), A., ii, 263.
- Serum-albumin. See Albumin.
- Sesame oil, oxidisability of (BISHOP), A., ii, 399.
- Sesquiterpene from oil of lignaloes (BARBIER and BOUVEAULT), A., i, 55.
 $C_{15}H_{24}$ from Charas (WOOD, SPIVEY, and EASTERFIELD), T., 542; P., 1896, 76.
- Setaria german*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Sheep. See Agricultural chemistry. (Appendix.)
- Shonkinite from Montana (WEED and PIRSSON), A., ii, 192.
- Silicate rocks, barium and strontium in (HILLEBRAND), A., ii, 191.
- Silicon, crystallised (DE CHALMOT), A., ii, 560.
 action of, on metals (VIGOUROUX), A., ii, 600.
 action of, on silver at high temperatures (MOISSAN), A., ii, 174.
- Silicon tetrachloride, action of potassium bromide on (SNAPE), A., ii, 641.
- Silicon tetrachloride, action of sodium and *p*-bromodimethylaniline on (COMBES), A., i, 417.
- Silicon chloroform, preparation of, from copper silicide and hydrogen chloride (COMBES), A., i, 416.
 action of aniline on (COMBES), A., i, 416.
 action of sodium and *p*-bromodimethylaniline on (COMBES), A., i, 417.
- Hydrofluosilicic acid, estimation of, in hydrofluoric acid (STAHL), A., ii, 621.
- Silicon oxide (*silica*), an artificial form of (RINNE), A., ii, 368.
 solubility of, in spring water (EDWARDS), A., ii, 246.
- Silicates, optical properties of earthy and compact (LACROIX), A., ii, 187.
 a new mineral (CESÀRO), A., ii, 481.
 containing fluorine, analysis of (REICH), A., ii, 531.
 decomposition of, by boric acid (JANNASCH), A., ii, 219; (JANNASCH and HEIDENREICH), A., ii, 576.
 decomposition of, by hydrofluoric acid (ALLEN), A., ii, 575.
 estimation of water in (JANNASCH and WEINGARTEN), A., ii, 272.
 separation of barium sulphate from (DE KONINGH), A., ii, 275.
 separation of quartz from (LUNGE), A., ii, 275.
- Silicon, estimation of, in aluminium (MOISSAN), A., ii, 339.
- Silk, absorption of dilute acids by (WALKER and APPLEYARD), T., 1334; P., 1896, 147.
- Silkworm, conversion of fat into glycogen in (COUVREUR), A., ii, 317.
- Sillimanite. See Fibrolite.
- Silver, extraction from lead by electrolysis of (TOMMASI), A., ii, 603.
 silver chloride cell, temperature coefficient of the E.M.F. of (LOVÉN), A., ii, 635.
 specific heat of (BARTOLI and STRACCIATI), A., ii, 145.
 melting point of (HOLBORN and WIEN), A., ii, 87.
 diffusion of, in mercury (ROBERTS-AUSTEN), P., 1896, 219.
 solubility and rate of diffusion of, in mercury (HUMPHREYS), T., 247; P., 1896, 9.
 rate of diffusion of, through tin (ROBERTS-AUSTEN), A., ii, 592.
 action of nitric acid on (HIGLEY and DAVIS), A., ii, 560.

- Silver, action of, on silicon at high temperatures (MOISSAN), A., ii, 174.
- Silver-alloys with cadmium, zinc, tin, antimony, melting points of (GAUTIER), A., ii, 646.
- with gold, solubility of, in potassium cyanide solutions (MACLAURIN), T., 1276; P., 1896, 149.
- with aluminium (GAUTIER), A., ii, 602.
- Silver amidoferrocyanide (HOFMANN), A., i, 69.
- amidosulphonate (DIVERS and HAGA), T., 1647; P., 1896, 181.
- chloride, fused, electrolysis of (LORENZ), A., ii, 23.
- solubility of, in potassium cyanide (COHEN), A., ii, 167.
- solubility of, in sodium thiosulphate (COHEN), A., ii, 167.
- solubility of, in tellurium tetrachloride (KNIGHT), A., ii, 613.
- chlorate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- chromate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- sodium imidosulphonates (DIVERS and HAGA), T., 1626.
- iodate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- mercuric iodide, decomposition of, by heat (BAUR), A., ii, 146.
- metaplumbate (GRÜTZNER), A., ii, 248.
- nitrate, electrical conductivity of solutions of, in acetone (LASZCZYNSKI), A., ii, 555.
- electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
- electrolysis of a solution of, in acetone (LASZCZYNSKI), A., ii, 556.
- velocity of the reaction of ethylic iodide on, in alcoholic solution (CHIMINELLO), A., ii, 351.
- magnesium nitrite (SPIEGEL), A., ii, 360.
- ruthenium nitrosobromide and nitrosochloride (BRIZARD), A., ii, 566.
- oxide, reaction of hydrogen peroxide with (RIEGLER), A., ii, 471.
- action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- peroxide (ŠULC), A., ii, 521.
- electrodes in galvanic cells (TOWER), A., ii, 142.
- peroxynitrate (MULDER and HERINGA), A., ii, 561.
- VOL. LXX. ii.
- Silver permanganate, action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- sodium pyrophosphate (STANGE), A., ii, 644.
- thiopyrophosphate (FERRAND), A., ii, 473.
- thiophosphite (FERRAND), A., ii, 418.
- silicide (CHALMOT), A., ii, 362.
- sulphate, product of the electrolysis of an ammoniacal solution of (GROSS), A., ii, 472.
- action of nitric oxide on (AUDEN and FOWLER), A., ii, 172.
- sulphide, action of infra-red rays on (RIGOLLOT), A., ii, 3.
- electrochemical preparation of (LORENZ), A., ii, 648.
- electrolytic experiments with (GROSS), A., ii, 521.
- physical change produced by gently heating (SPRING), A., ii, 290.
- double sulphide of gold and (MACLAURIN), T., 1271; P., 1896, 149.
- Silver allylide (KEISER), A., i, 458.
- cyanide, compounds of, with cyanides of the alkalis and alkaline earths (VARET), A., i, 633.
- cyanoforn (SCHMIDTMANN), A., i, 458.
- Silver, detection of, microchemically (TRAUBE), A., ii, 578.
- estimation of, by Gay-Lussac's method (HOITSEMA), A., ii, 624.
- estimation of, in copper and copper matte (SMITH), A., ii, 76.
- separation of, from gold by volatilisation (RICHARDS), A., ii, 674.
- separation of, from zinc, nickel, and cobalt, electrolytically (SMITH and WALLACE), A., ii, 220.
- Skin, causes of respiratory exchange through the (REID), A., ii, 42.
- Skleroklase. See Sartorite.
- Slag, basic, crystalline constituents of (CARNOT), A., ii, 522.
- effect of, on germination (CLAUDEL and CROCHETELLE), A., ii, 442.
- estimation of citrate soluble phosphoric acid in (WAGNER), A., ii, 448; (PASSON), A., ii, 575; (DUBBERS), A., ii, 673.
- estimation of phosphorus in, by citrate process (MACH and PASSON), A., ii, 389.
- See also Agricultural chemistry (Appendix).
- Slag, tin, analysis of (BAILEY), A., ii, 451.
- Smaltite from Sardinia (LOVISATO), A., ii, 183.

- Soap, analysis of (SPAETH), A., ii, 400.
 detection of, in lubricants
 (SCHWEITZER and LUNGWITZ),
 A., ii, 400.
 estimation of phenol in (FRESENIUS
 and MAKIN), A., ii, 580.
- Soaps, behaviour of, as crystalloids and
 colloids (KRAFFT and WIGLOW),
 A., i, 80.
 behaviour of, with water (KRAFFT
 and WIGLOW), A., i, 80.
- Sobreritritol, oxidation of, and its
 hydrate (GINZBERG), A., i, 446.
- Sobrerol, constitution of (TILDEN), T.,
 1014.
 oxidation of, and its diacetate (GINZ-
 BERG), A., i, 446.
 from trihydroxymenthane (GINZ-
 BERG), A., i, 447.
- Sobrerone. See Pinol.
- Soda-berzeliite from Långban, Sweden
 (SJÖGREN), A., ii, 113.
- Sodalite from Canada, Urals, and Africa
 (LUQUER and VOLCKENING), A., ii,
 37.
 from Naples (FRANCO), A., ii, 313.
 from North Scotland (TEALL and
 HORNE), A., ii, 117.
 formula of (RAMMELSBERG), A., ii,
 190.
- Soda-richterite from Långban, Sweden
 (SJÖGREN), A., ii, 114.
- Sodioacetoacetic acid. See Acetoacetic
 acid, sodio-.
- Sodioacetylacetone. See Acetylacetone,
 sodio-.
- Sodiccyanoform. See Cyanoform, sodio-.
- Sodiodesmotroposantonous acid. See
 Desmotroposantonous acid.
- Sodiodymethylpropanetricarboxylic acid.
 See Dimethylpropanetricarboxylic
 acid, sodio-.
- Sodioethylmalonic acid. See Ethyl-
 malonic acid, sodio-.
- Sodiomalonic acid. See Malonic acid,
 sodio-.
- Sodiomethylmalonic acid. See Methyl-
 malonic acid, sodio-.
- Sodioisopropylmalonic acid. See *iso*-
 Propylmalonic acid, sodio-.
- Sodioisopropylpropanetricarboxylic
 acid. See *iso*-Propylpropanetricarb-
 oxylic acid, sodio-.
- Sodiosantonous acid. See *l*-Santonous
 acid.
- Sodium, fluorescence spectrum of the
 vapour of (WIEDEMANN and
 SCHMIDT), A., ii, 346.
 spark spectra of the salts of (DE
 GRAMONT), A., ii, 585.
 presence of, in aluminium (MOISSAN),
 A., ii, 301.
- Sodium:—
 Sodamide, synthesis with derivatives
 of (BLACHER), A., i, 33.
- Sodium salts, action of, on coagulation of
 milk and blood (RINGER), A., ii, 49.
- amidosulphonate, preparation of, from
 sodium nitrite (DIVERS and
 HAGA), T., 1646.
 electrolytic conductivity of (SAKU-
 RAI), T., 1657; P., 1896, 181.
- selenoarsenate (SZARVASY), A., ii, 98.
- monoselenoarsenate (SZARVASY),
 A., ii, 98; (WEINLAND and
 RUMPF), A., ii, 473.
- oxyselenoarsenate (CLEVER and
 MUTHMANN), A., ii, 19.
- thioselenoarsenate (CLEVER and
 MUTHMANN), A., ii, 19.
- thioarsenate (McCAY), A., ii, 359.
- monothioarsenate (WEINLAND and
 RUMPF), A., ii, 473.
- dithioarsenate (WEINLAND and
 RUMPF), A., ii, 473.
- selenoarsenite (CLEVER and MUTH-
 MANN), A., ii, 19.
- thioantimonate, preparation of
 (PRUNIER), A., ii, 565.
- bromide, thermochemical data of the
 compound of mercuric cyanide with
 (VARET), A., ii, 88.
- carbonate, formation of, in nature
 (TANATAR), A., ii, 419.
 freezing points of dilute solutions
 of (LOOMIS), A., ii, 352.
- magnesium carbonate (SCHULTEN),
 A., ii, 610.
 chlorocarbonate (SCHULTEN), A., ii,
 610.
- chloride, heat of solution of (VON
 STACKELBERG), A., ii, 589.
 freezing points of aqueous solu-
 tions of (POXSOT), A., ii, 412.
 freezing points of dilute solutions
 of (ABEGG), A., ii, 588.
- influence of pressure on the solu-
 bility in water of (VON STACKEL-
 BERG), A., ii, 638.
- See also Agricultural chemistry
 (Appendix).
- hydrosulphide, estimation of, in pre-
 sence of the sulphide (DOBRINER
 and SCHRANZ), A., ii, 672.
- hydroxide, heat of combination of,
 with water in the liquid and solid
 states (PICKERING), A., ii, 148.
- vapour pressures of, in ethylic
 alcohol solution and the products
 obtained by evaporation (LES-
 COEUR), A., i, 114.
 estimation of, in presence of the
 sulphide (DOBRINER and
 SCHRANZ), A., ii, 673.

Sodium imidosulphonates (DIVERS and HAGA), T., 1621; P., 1896, 179.
 barium imidosulphonates (DIVERS and HAGA), T., 1622.
 calcium imidosulphonate (DIVERS and HAGA), T., 1626; P., 1896, 179.
 mercury imidosulphonates (DIVERS and HAGA), T., 1629; P., 1896, 179.
 silver imidosulphonate (DIVERS and HAGA), T., 1626.
 strontium imidosulphonate (DIVERS and HAGA), T., 1625; P., 1896, 179.
 iodide, thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
 molybdate, electrolysis of (STAVENHAGEN and ENGELS), A., ii, 28.
 iodomolybdate (CHRÉTIEN), A., ii, 651.
 nitrate, thermal expansion of solutions of (DE LANNON), A., ii, 233.
 freezing points of dilute solutions of (LOOMIS), A., ii, 352.
 effect of, on germination (CLAUDEL and CROCHETELLE), A., ii, 442.
 See also Agricultural chemistry (Appendix).
 peroxide, formation of, in the electrolysis of solutions of sodium hydroxide (RICHARZ and LONNES), A., ii, 586.
 monohydrogen phosphate, dissociation pressure of hydrated (MULLER-ERZBACH), A., ii, 295.
 hydrogen phosphate, hydrated, transition point of (BAUR), A., ii, 146.
 silver pyrophosphate (STANGE), A., ii, 644.
 triphosphate (STANGE), A., ii, 643.
 copper triphosphates (STANGE), A., ii, 643.
 ferrous triphosphate (STANGE), A., ii, 643.
 lead triphosphate-pyrophosphate (STANGE), A., ii, 644.
 manganese triphosphate (STANGE), A., ii, 643.
 magnesium triphosphate (STANGE), A., ii, 643.
 triphosphide and its ammonia compound (HUGOT), A., ii, 20.
 persulphate, molecular formula of (LÖWENHERZ), A., ii, 149.
 selenide (CLEVER and MUTHMANN), A., ii, 19.
 sulphate, freezing points of dilute solutions of (LOOMIS), A., ii, 352.

Sodium sulphate, hydrated, depression of the melting point of (LÖWENHERZ), A., ii, 149.
 viscosity of aqueous solutions of (D'ARCY), T., 999; P., 1896, 104.
 condition of, in solution (D'ARCY), T., 993; P., 1896, 104.
 double salt of amidosulphonic acid and (DIVERS and HAGA), T., 1646.
 sulphide, estimation of, in presence of the hydrosulphide (DOBRINER and SCHRANZ), A., ii, 672.
 estimation of, in presence of the hydroxide (DOBRINER and SCHRANZ), A., ii, 673.
 sulphides, oxidation of, by electrolysis (DURKEE), A., ii, 559.
 thiosulphate, solubility of, in alcohol (PARMENTIER), A., ii, 359.
 metatungstate, physical properties of (SOBOLEFF), A., ii, 478.
 ammonium paratungstates (HALLOPEAN), A., ii, 652.
 phosphododecatungstate, physical properties of (SOBOLEFF), A., ii, 477.
 Sodium aminoferrocyanide (HOFMANN), A., i, 518.
 and the products of the action of nitrogen oxides on (HOFMANN), A., i, 69.
 antimoniomucate (HENDERSON and BARR), T., 1453; P., 1896, 168.
 arsenite ferrocyanide (HOFMANN), A., i, 518.
 chromothiocyanate, absorption spectrum of (MAGNANINI), A., ii, 345.
 ethoxide, vapour pressures of, in ethylic alcohol solution, and the products obtained by evaporation (LESCŒUR), A., i, 113, 114.
 Trisodium ferrocyanide (HOFMANN), A., i, 517.
 action of ammonia on (HOFMANN), A., i, 518, 519.
 action of nitric oxide or sodium nitrite on (HOFMANN), A., i, 518.
 Sodium molybditartrate (HENDERSON and BARR), T., 1455; P., 1896, 169.
 nitroferrocyanide (*nitroprusside*), action of sodium amalgam, of gaseous ammonia, and of the ethylamines on (HOFMANN), A., i, 69, 70.
 action of hydroxylamine and sodium hydroxide on (HOFMANN), A., i, 519.

- Sodium nitroferrocyanide (*nitroprusside*), action of phenylhydrazine on (HOFMANN), A., i, 517.
 action of potassium cyanide on (HOFMANN), A., i, 519.
 action of sodium arsenite on (HOFMANN), A., i, 518.
 action of sodium hydrogen sulphite on (HOFMANN), A., i, 197.
 nitrosoferrocyanide probably contains an oximido-group (HOFMANN), A., i, 269.
 action of sodium hydroxide on (HOFMANN), A., i, 269.
 oleate, boiling points of alcoholic solutions of (KRAFFT and STRUTZ), A., ii, 467.
 running together and healing of crystals of (LEHMANN), A., ii, 160.
 thiocyanate, electrical conductivity of solutions of, in acetone (LASZCZYNSKI), A., ii, 555.
 electrolysis of a solution of, in acetone (LASZCZYNSKI), A., ii, 556.
 tungstic tartrate (HENDERSON and BARR), T., 1456; P., 1896, 169.
 Sodium, estimation of, in aluminium (MOISSAN), A., ii, 339.
 estimation of, in fire-clays, manures, &c. (CAMERON), A., ii, 392.
 Soja bean. See Agricultural chemistry (Appendix).
 Soils. See Agricultural chemistry (Appendix).
 Solid solutions. See Solutions, solid, and Heat, freezing point.
 Solubility, mathematical treatment of (VAN LAAR), A., ii, 154.
 at temperatures near the freezing point of the solvent (ARCTOWSKI), A., ii, 353.
 influence of pressure on (VON STACKELBERG), A., ii, 637.
 of substances under pressure, apparatus for determining the (WALTER), A., ii, 297.
 of solids in gases (ARCTOWSKI), A., ii, 635.
 of optically active substances in active solvents (TOLLOCZKO), A., ii, 636.
 of optical isomerides (WALDEN), A., ii, 553.
 of metals and alloys in mercury (HUMPHREYS), T., 1679; P., 1896, 220.
 of mixed crystals (STORTENBEKER), A., ii, 13.
 of ammonia in water at different temperatures (KONOWALOFF), A., ii, 351.
 Solubility of carbonic anhydride in aniline (KONOWALOFF), A., ii, 351.
 of ether in water, diminution produced by dissolving foreign substances in the ether of the (TOLLOCZKO), A., ii, 636.
 of nitrous oxide in water and in solutions of salts (GORDON), A., ii, 154.
 of silver and of copper in mercury (HUMPHREYS), T., 247; P., 1896, 9.
 Solution, dynamical condition of molecules in (FITZGERALD), T., 902.
 Solution theory of dyeing (WALKER and APPELYARD), T., 1348; P., 1896, 147.
 Solutions, mathematical treatment of the properties of (VAN LAAR), A., ii, 154.
 potential difference between dilute (TOWER), A., ii, 586.
 theory of the conductivity of dilute (BEKETOFF), A., ii, 348.
 influence of pressure on the electrical conductivity of (TAMMANN), A., ii, 6.
 specific heat of (TAMMANN), A., ii, 289.
 determination of the freezing point of (WILDERMANN), A., ii, 589; (PON-SOT), A., ii, 636.
 density of very dilute (KOHLRAUSCH), A., ii, 89.
 adiabatic changes in the volumes of (ROGOYSKI and TAMMANN), A., ii, 514.
 changes of volume during the formation of dilute (JONES), P., 1895, 179.
 connection between pressure and the volume of (TAMMANN), A., ii, 13.
 colloidal theory of (KRAFFT), A., ii, 468.
 separation of pure ice from dilute (ZOPPELLARI), A., ii, 514.
 condition of sodium sulphate in aqueous (D'ARCY), T., 993; P., 1896, 104.
 of organic substances, magnetic rotatory power of (PERKIN), T., 1052; P., 1896, 122.
 of salts, connection between concentration and conductivity of (VAN'T HOFF), A., ii, 145; (STORCH), A., ii, 288; (KOHLRAUSCH), A., ii, 295.
 thermal expansion of (DE LANNON), A., ii, 233.
 influence of, on water of crystallisation (BRAUNS), A., ii, 111.
 influence of acids on the proteolytic digestion of (DASTRE), A., ii, 118.

- Solutions, solid, formation of, in freezing point determinations (GARELLI), A., ii, 292.
 formed by non-isomorphous substances (GARELLI), A., ii, 469.
 influence of the constitution of organic substances on the formation of (GARELLI), A., ii, 157.
 See also Heat, freezing point.
- Sophora angustifolia*, matrine, the alkaloid of (PLUGGE), A., i, 68.
speciosa, occurrence of cytisine in, and other plants of same natural order (PLUGGE), A., ii, 61.
- Sorbic acid, discovery of (HOFMANN LECTURE), T., 698.
- Sorbinose, action of oxalic acid on (KIEMAYER), A., i, 145.
- Sorbitol, triacetone derivative of (SPEIER), A., i, 77.
- Sorbose, formation of, by microbes (BERTRAND), A., ii, 494.
- Sorboseamine (DE BRUYN and VAN LEENT), A., i, 586.
- Sorbus*, non-existence of sorbose in juice of various varieties of (BERTRAND), A., ii, 494.
- Sow-beans, alcoholic extract from (RITTHAUSEN), A., i, 416.
- Sparteine, constitution of (HERZIG and MEYER), A., i, 68.
- Specific gravity. See Density, relative.
- Specific inductive capacity. See Electricity, dielectric constant.
- Spectrum. See Light.
- Spergula arvensis*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Spermatozoa, separation of thymine from (KOSSEL), A., ii, 537.
- Sperrylite from Ontario (WALKER), A., ii, 366.
- Spessartite from Bodenmais, Bavaria (WEINSCHENK), A., ii, 310.
- Sphene from the Tyrol (SOLTMANN), A., ii, 374.
- Spherulites and matrix of rocks (HYNDMAN and BONNEY), A., ii, 614.
- Sphingosine (HUDICHUM), A., i, 400.
- Spirit, rectified, estimation of fusel oil in (GLASENAPP), A., ii, 277.
- Spirits, estimation of alcohols and volatile acids in (DUCLAUX), A., ii, 504.
 estimation of fusel oil in (STUTZER and MAUL), A., ii, 504.
 of wine, estimation of aldehyde in (MEDICUS), A., ii, 505.
- Spiræa ulmaria* *S. filipendula* and *S. salicifolia*, existence of gaultherase in (BOURQUELOT), A., ii, 540.
- Spirogyra*, detection of a proteid substance in cells of (LOEW), A., ii, 58.
- Spodiosite from Nordmark, Sweden (NORDENSKIÖLD), A., ii, 255.
- Squash, edestin, the proteid in (OSBORNE and CAMPBELL), A., i, 716.
- Stachydrine and its constitution and derivatives (JAHNS), A., i, 712.
- Stachys tubrifera*, stachydrine from (JAHNS), A., i, 712.
- Stannic. } See under Tin.
 Stannous. }
- Starch, formation of, from sugar in plants (GRÜSS), A., ii, 59.
 potato-, hydrolysis of (BÜLOW), A., i, 273.
 action of diastase on (ULRICH), A., i, 335; (MITTELMEIER), A., i, 336.
 action of diastase on, in chloroform solution (BÜLOW), A., i, 274.
 action of glycerol on (ZULKOWSKI and FRANZ), A., i, 120.
 action of glyoxylic acid on (BOETTINGER), A., i, 5.
 influence of, on metabolism (WICKE and WEISKE), A., ii, 535.
 reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 151; P., 1896, 9.
- Starch. See also Agricultural chemistry (Appendix).
- Starches. See also:—
 Garlic, inulin of; Glycogen; Inulin; Jecorin; Starch.
- Stearamide (DIXON), T., 1602.
- Stearic acid from rapic acid (ZELLNER), A., i, 593.
 from tariric or stearolic acids (ARNAUD), A., i, 522.
 action of light on (RICHARDSON and FORTEY), T., 1349.
 action of sulphur on (ALTSCHUL), A., i, 126.
 behaviour of alkali salts of, with water (KRAFFT and WIGLOW), A., i, 80.
- Stearic chloride, action of lead thiocyanate on (DIXON), T., 1599.
- Stearolic acid (BEHREND), A., i, 410.
 action of phosphorus and hydriodic acid on (ARNAUD), A., i, 522.
- Stearoptene, $C_{15}H_{26}O$, from *Ledum palustre* (HJELT), A., i, 248.
- Stearoxylic acid, constitution of (SPIECKERMANN), A., i, 410.
- Stearylbenzidide (DIXON), T., 1602, 1603.
- ab*-Stearyl- α -naphthylthiocarbamide, and the action of silver nitrate on (DIXON), T., 1601; P., 1896, 223.

- Stearyl- α -naphthylurea (DIXON), T., 1601; P., 1896, 223.
 n -Stearyl- n -phenylbenzylthiourea, and action of silver nitrate on (DIXON), T., 1602; P., 1896, 223.
 α -Stearyl- b -phenylbenzylurea (DIXON), T., 1602; P., 1896, 223.
 Stearylthiocarbimide (DIXON), T., 1599. action of ammonia, benzylamine, benzylaniline, α -naphthylamine, phenylhydrazine, piperidine, o -toluidine, and m -xylylidine on (DIXON), T., 1601, 1602.
 αb -Stearyl- o -tolylthiocarbamide, and the action of silver nitrate on (DIXON), T., 1600; P., 1896, 223.
 Stearyl- o -tolylurea (DIXON), T., 1600; P., 1896, 223.
 αb -Stearyl- m -xylylthiocarbamide, and the action of silver nitrate on (DIXON), T., 1600; P., 1896, 223.
 αb -Stearyl- m -xylylurea (DIXON), T., 1601; P., 1896, 223.
 Steel. See Iron.
 Stephanite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
Sterculia plantanifolia, occurrence of araban in the mucilage of (YOSHIMURA), A., ii, 60.
 Stereocaulic acid, occurrence of (ZOFF), A., i, 104.
Stereocaulon, occurrence of atranoric acid in different species of (ZOFF), A., i, 103.
 Sternbergite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
 Stibethyl. See Triethylstibine.
 Stibnite, capillary (LASPEYRES and KAISER), A., ii, 660.
 from Queensland (LIVERSIDGE), A., ii, 657.
 Stilbene (*diphenylethylene*), magnetic rotatory power, &c., of (PERKIN), T., 1150, 1225, 1246.
 α and β -dibromide (WISLICENUS and SEELER), A., i, 98.
 dibromide, action of sodium benzene-sulphinate on (OTTO), A., i, 242.
 Stilbenedisulphonic acid, nitroso-, reduction of, with ferrous sulphate, and oxidation of, with chromic acid (FISCHER and HEPP), A., i, 51.
 Stibite from the Caucasus (ZEMJAT-SCHENSKY), A., ii, 369.
 from Thuringia (FROMME), A., ii, 370.
 Stinkstone. See Anthraconite.
 Stirrer; autopneumatic (BREARLEY), A., ii, 671.
 Stomach, digestion in (SJÖQVIST), A., ii, 484.
 Stomach, causes of the formation of acid in (KOEPE), A., ii, 376.
 gases of human (WISSEL), A., ii, 196.
 Straw, carbohydrates of barley- (CROSS, BEVAN, and SMITH), T., 1604; P., 1896, 174.
 Straws, existence of xylose-formal in the cellulose of cereal- (CROSS, BEVAN, and SMITH), T., 815; P., 1896, 96.
 Stromeyerite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
 Strontianite from Ontario (HOFFMANN), A., ii, 259.
 Strontium in rocks (HILLEBRAND), A., ii, 191.
 compounds, purification of (SÖRENSEN), A., ii, 360.
 salts, influence of, on blood coagulation (HORNE), A., ii, 437.
 bromide, thermochemical data of the compound of mercuric cyanide and (VARET), A., ii, 88.
 oxybromide, thermochemical data of (TASSILLY), A., ii, 465.
 imidosulphonates (DIVERS and HAGA), T., 1622; P., 1896, 179.
 iodide, hydrated, thermochemical data of (TASSILLY), A., ii, 350.
 thermochemical data of the action of mercuric cyanide on (VARET), A., ii, 148.
 niobate (LARSSON), A., ii, 564.
 nitrate, thermal expansion of solutions of (DE LANNON), A., ii, 233.
 oxide (*strontia*), crystallised (BRÜGELMANN), A., ii, 167.
 Strontium, estimation of, volumetrically, by alkalis (RUOSS), A., ii, 500.
 separation of calcium and barium from (DUPASQUIER), A., ii, 450.
Strophanthus, a glucoside from species of (FRASER and TILLIE), A., i, 386.
hispidus seed oil, analysis of (MJÖEN), A., ii, 506.
 Strychnine, effect of, on the germination seeds (Mosso), A., ii, 326.
 effect of, on plant development (OTTO), A., ii, 211.
 sulphur compound of (HOFMANN LECTURE), T., 719.
 Strychnine, detection of (MANKIEWICZ), A., ii, 344; (FORMÁNEK), A., ii, 401.
 detection of, in corpses (SPAETH), A., ii, 508.
 estimation of nitrogen in, by the absolute method (DUNSTAN and CARR), P., 1896, 48.

- Sturgeon, protamines from the sperm of (KOSSEL), A., i, 582.
- Sturine (KOSSEL), A., i, 582.
- Styrene (*cinnamene*), magnetic rotatory power, &c., of (PERKIN), T., 1143, 1149, 1224, 1246.
- nitrosite, ammonia derivative of (SOMMER), A., i, 295.
- nitrosite and its hydrochloride (SOMMER), A., i, 295.
- β -Styrene nitrosite and its silver salt (SOMMER), A., i, 295.
- Styryl methyl ketone (*benzylideneacetone*), magnetic rotatory power, &c., of (PERKIN), T., 1145, 1229, 1247.
- reduction of (HARRIES and ESCHENBACH), A., i, 306.
- Suberic acid, azoimide of (CURTIUS and CLEMM), A., i, 464.
- hydrazide of (CURTIUS and CLEMM), A., i, 464.
- Sublimation in the cathode-light vacuum (KRAFFT and WEILANDT), A., ii, 635.
- velocity of iodine (ARCTOWSKI), A., ii, 636.
- of mercury haloid salts (ARCTOWSKI), A., ii, 635.
- Substance, $C_4H_5N_3O_3$, from hydroxylamine and glyoxal (MIOLATI), A., i, 276.
- $C_4H_8N_2SBr_2$, from the action of bromine on allylthiourea (DIXON), T., 19; P., 1895, 215.
- action of caustic alkali on (DIXON), T., 19.
- $C_4H_8N_2SI_2$, from allylthiourea and iodine (DIXON), T., 25; P., 1895, 216.
- action of caustic potash on (DIXON), T., 26; P., 1895, 216.
- action of silver chloride on (DIXON), T., 25.
- $C_4H_8N_2SCHI$, from $C_4H_8N_2SI_2$ and silver chloride (DIXON), T., 25.
- $C_6H_6O_3$, from action of oxalic acid on levulose (DÜLL), A., i, 121.
- $C_6H_9N_3O_3$, from acetoneoxime and hydroxylamine hydrochloride (JOVITSCHITSCH), A., i, 79.
- $C_6H_9N_3O_3$, from sulphuric acid and 4 : 5-oximidomethylisoxazolone (JOVITSCHITSCH), A., i, 81.
- $C_7H_5N_2$, from formaldehyde and excess of phenylhydrazine (WALKER), T., 1282.
- action of sodium ethoxide and sodium on (WALKER), T., 1283.
- action of excess of formaldehyde on (WALKER), T., 1284.
- Substance, $C_7H_{12}N_2O$, from the hydrobromide of ethylic hexahydroanthranilate amide (EINHORN and BULL), A., i, 472.
- $C_8H_{10}O_9$, from dihydroxymaleic acid and hydrogen bromide in presence of acetic acid (FENTON), T., 559.
- $C_8H_{14}N_2O_2$, from the action of heat on hydrazidodiisobutyric acid (THIELE and HEUSER), A., i, 341.
- $C_8H_{16}O$, derived from isobutaldehyde (FRANKE), A., i, 404.
- $C_8H_{16}O_4$, from the action of alcohol and zinc dust on dibromodipropylisopropyl alcohol (OBERREIT), A., i, 666.
- $C_6H_{12}O_6, C_2H_2O_3 + H_2O$, from glyoxylic acid and glucose (BOETTINGER), A., i, 6.
- $C_8H_{16}N_6O_4$, from the action of hydrazine hydrate on ethylic succinamidoacetate (RADENHAUSEN), A., i, 138.
- $C_9H_6N_2O$, from hippurylazoimide (CURTIUS), A., i, 38.
- $C_{10}H_{10}O_2$ or $C_{10}H_{12}O_2$, from oil of aniseed (BOUCHARDAT and TARDY), A., i, 380.
- $C_{10}H_{13}NO_6$, from *trans*- π -camphanic acid (KIPPING), T., 961.
- $C_{10}H_{14}O_4$, from the action of sulphuric acid on ethylic α -acetyl- α_1 -isobutylsuccinate (AUWERS and SCHIFFER), A., i, 645.
- $C_{10}H_{16}O_3Br_2$, from oxymenthyllic acid and bromine (BECKMANN and MEHRLÄNDER), A., i, 312.
- $C_{10}H_{17}Br_3O$, from *l*-menthone and bromine (BECKMANN and MEHRLÄNDER), A., i, 312.
- $C_{10}H_{18}O_2$, derived indirectly from isobutaldehyde (KOHN), A., i, 10.
- $C_6H_{12}O_6, 2C_2H_3O_2$, from levulose and glyoxylic acid (BOETTINGER), A., i, 6.
- $C_{10}H_{20}O_2$, from the ethereal oil of *Piper Lowong* (PEINEMANN), A., i, 495.
- $C_{10}H_{20}O_2$, from the action of potash on isovaleraldehyde (KOHN), A., i, 461.
- $C_{13}H_{16}O_4Cu$, obtained from the α -copper derivative of ethylic hydroxymethylenepherylacetate (WISLICHENUS), A., i, 554.
- $C_{14}H_{16}O_4$, from diacetylacetone, oxime, conversion of, into dihydroxyacetyldimethylnaphthalene, and behaviour of, towards ammonia (COLLIE and WILSMORE), T., 300; P., 1896, 47.

- Substance, $C_{14}H_{16}N_4$, from methenehydrazone and ethylic acetate (WALKER), T., 1286, 1287.
- $C_{14}H_{19}BrN_2O_5$, from the oxidation product of camphoric acid, and its calcium salt (BALBIANO), A., i, 493.
- $C_{15}H_{10}O_4$, from the root of *Rumex nepalensis* (HESSE), A., i, 315.
- $C_{15}H_{16}N_4$, preparation of two isomeric forms of, from formaldehyde and phenylhydrazine (WALKER), T., 1280, 1281.
- $C_{15}H_{16}N_4$, from phenylhydrazine and methylene dimethylic ether (GOLD-SCHMIDT), A., i, 543.
- $C_{16}H_{12}O_4$, from the root of *Rumex nepalensis* (HESSE), A., i, 315.
- $C_{16}H_{18}N_4$, from ethyl-*o*-phenylenediamine, and its hydrochloride and carbonate (KEHRMANN and HERTZ), A., i, 509.
- $C_{16}H_{18}N_4O$, from phenylhydrazine and methylene dimethylic ether, and its hydrochloride (GOLD-SCHMIDT), A., i, 543.
- $C_{16}H_{18}N_4O$, from $C_7H_8N_2$ and formaldehyde (WALKER), T., 1284.
- $C_{16}H_{26}N_2O_4$, from ethylic acetoacetate and piperazine (ROSDALSKY), A., i, 257.
- $C_{16}H_{32}O_2$, derived from isobutaldehyde (FRANKE), A., i, 404.
- $C_{17}H_{20}N_8$, from the action of diazobenzene chloride on hexamethylenetetramine (DUDEN and SCHARFF), A., i, 123.
- $C_{18}H_{12}O_3$, from α -hydrindone and bromine (REVIS and KIPPING), P., 1895, 214.
- $C_{18}H_{13}BrO_2$, from monobromohydrindone (REVIS and KIPPING), P., 1895, 214.
- $C_{18}H_{16}O_4$, from the root of *Rumex nepalensis* (HESSE), A., i, 315.
- $C_{18}H_{17}N_2Br_2IO_2$, from the action of alkalis on 4:1-bromhydroxyquinoline methiodide (CLAUS and MOHL), A., i, 697.
- $C_{18}H_{19}NO_4$, formed by the oxidation of bebirine (SCHOLTZ), A., i, 710.
- $C_{18}H_{30}O$, from *Convolvulus orizabeus* (KROMER), A., i, 385.
- $C_{19}H_{12}N_2O_3$, from *o*-chlorobenzeneazosalicylic acid (HEWITT and STEVENSON), T., 1261; P., 1896, 149.
- $C_{19}H_{16}O_4$, from benzoyldiacetyl methane and benzoic chloride (CLAISEN and FALK), A., i, 560.
- $C_{20}H_{18}N_2S_2O_4$, obtained by the action of ethylenic bromide on diphenylsulphone-*m*-phenylenediamine (HINSBERG and STRUPLER), A., i, 48.
- Substance, $C_{20}H_{20}N_2O_3$, from the condensation of ethylic pyruvate with aniline (SIMON), A., i, 86.
- $C_{20}H_{30}O_2$, from $\alpha\pi$ -dibromocamphor (REVIS and KIPPING), P., 1896, 77.
- $C_{21}H_{16}O_4N_4$, from *o*-nitrobenzaldehyde and *o*-aminobenzylamine (BUSCH), A., i, 503.
- $C_{22}H_{24}N_2O_3$, from ethylic pyruvate and *p*-toluidine (SIMON), A., i, 86.
- $C_{23}H_{24}N_4O$, from acetophenonehydrazone and formaldehyde (WALKER), T., 1286.
- $C_{23}H_{26}N_2O_3$, from the condensation of aniline with isoamylic pyruvate (SIMON), A., i, 86.
- $C_{24}H_{15}N_3O_5 + \frac{1}{2}H_2O$, from cyanobenziline and nitrous acid (HERFELDT), A., i, 393.
- $C_{24}H_{19}N_5$, from *p*-phenylenediamine and aposafranine (FISCHER and HEPP), A., i, 324.
- $C_{24}H_{20}N_2O$, from bisnitrosodimethylnaphthalene (CANNIZZARO and ANDREOCCI), A., i, 489.
- $C_{24}H_{20}N_2O_3$, from the condensation of allylic pyruvate with aniline (SIMON), A., i, 86.
- $C_{25}H_{17}N_3O_2$, from *o*-chlorobenzeneazosalicylic acid (HEWITT and STEVENSON), T., 1260; P., 1896, 149.
- $C_{25}H_{22}N_2O_3$, from the condensation of aniline with benzylic pyruvate (SIMON), A., i, 86.
- $C_{25}H_{30}N_2O_3$, from the condensation of *p*-toluidine with isoamylic pyruvate (SIMON), A., i, 86.
- $C_{26}H_{16}O_2$, from tetraphenylenepinacol on oxidation (KLINGER and LONNES), A., i, 691.
- $C_{26}H_{18}O$, from benzylic acid (KLINGER and LONNES), A., i, 375.
- $C_{26}H_{18}O_2$, from the oxidation of the hydrocarbon $C_{26}H_{18}$ (KLINGER and LONNES), A., i, 691.
- $C_{26}H_{18}O_7$, from the reduction of euxanthone (MANN and TOLLENS), A., i, 449.
- $C_{27}H_{24}N_4$, from benzylidenehydrazone and formaldehyde (WALKER), T., 1285.
- $C_{28}H_{21}N_3O_3$, from tetraphenyldihydropyridazine (SMITH and RANSON), A., i, 322.
- $C_{28}H_{22}O$, from substance $C_{28}H_{22}O_2$ on reduction (JAPP and LANDER), T., 744.

- Substance, $C_{25}H_{22}O$, from anhydrazetonedibenzil on reduction (JAPP and LANDER), T., 745.
- $C_{25}H_{22}O_2$, from the reduction of ethylic anhydrodibenzilacetoacetate (JAPP and LANDER), T., 744.
- $C_{25}H_{23}N_3O_2$, from tetraphenyldihydropyridazine (SMITH and RANSOM), A., i, 322.
- $C_{30}H_{22}N_4Cl_2$, from *o*-aminodiphenylamine and benzoic acid (KEHMANN and BURGIN), A., i, 631.
- $C_{31}H_{24}O$, from the reduction of ethylic anhydrodibenzilacetoacetate (JAPP and LANDER), T., 744; P., 1895, 146.
- $C_{39}H_{26}O_2$, from the oxidation of bidiphenylethylene (GRAEBE and VON MANTZ), A., i, 442.
- Substituents in the ortho-position, "protecting influence" of (MELDOLA and STREATFIELD), P., 1896, 51.
- Succinamic acid, bromo-, action of alcoholic ammonia on (PIUTTI), A., i, 668.
- l-bromo- (WALDEN), A., i, 139.
- Succinamide, action of potash and bromine on (WEIDEL and ROITHNER), A., i, 470.
- action of sodium hypochlorite on (DE CONINCK), A., i, 282.
- Succinanil (DUNLAP), A., i, 471.
- dibromo- (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Succinanilic acid, dibromo-, and the action of heat on (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Succinethylimide, velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.
- Succinic acid from camphene (MARSH and GARDNER), T., 84; P., 1895, 206.
- free, non-occurrence of, in gedanite (HELM), A., i, 57.
- heat of electrolytic dissociation of (KORTRIGHT), A., ii, 463.
- sublimation temperature of, under small pressure (KRAFFT and DYES), A., ii, 89.
- action of uranium nitrate on (FAY), A., i, 465.
- absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
- Succinic acid, methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
- ethylic salt, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.
- action of hydroxylamine on (ERRERA), A., i, 286.
- Succinic acid, ethylic salt, peroxydioxime (JOVITSCHITSCH), A., i, 82.
- Succinic acid, halogen substitution products of, conversion of, into the corresponding malic acids (WALDEN), A., i, 205.
- bromo-, rotatory power of the methylic, ethylic, propylic, and isobutylic salts of (WALDEN), A., ii, 137.
- l-bromo- and d-bromo-, preparation of, from asparagine and aspartic acid (WALDEN), A., i, 205.
- methylic salt (WALDEN), A., i, 139.
- dibromo-, ethylic salt, action of sodium ethoxide on (MICHAEL and BUCHER), A., i, 85.
- conversion of, into ethylic ethoxyfumarate (MICHAEL and BUCHER), A., i, 599.
- iso-dibromo-, conversion of, into dibromo- (MICHAEL), A., i, 132.
- chloro-, rotatory power of the methylic, ethylic, propylic, isobutylic, and amylic salts of (WALDEN), A., ii, 137.
- l-chloro-, from asparagine (WALDEN), A., i, 139.
- dextro- and inactive chloro-, rotatory power of the lævo- and inactive amylic salts of (WALDEN), A., ii, 139.
- dichloro- (MICHAEL and TISSOT), A., i, 132.
- hydrothio- (ANDREASCH), A., i, 90.
- Succinic acids, substituted, relative volatility of (AUWERS and SCHLOSSER), A., i, 639.
- iso-Succinic acid. See Methylmalonic acid.
- Succinic anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.
- action of anthranilic acid on (AUWERS and HARGER), A., i, 641.
- action of secondary bases on (AUWERS and HARGER), A., i, 640.
- action of carbamide and thiocarbanilide on (DUNLAP), A., i, 471.
- action of hydroxylamine on (ERRERA), A., i, 209.
- reduction products of (FICHTER and HERBRAND), A., i, 463.
- Succinic chloride, chloro-, rotatory power of (WALDEN), A., ii, 137.
- Succinic peroxide, and the action of phenylhydrazine on (VANINO and THIELE), A., i, 597.
- Succinimide (DUNLAP), A., i, 471.
- heat of solution of, in water and ethylic alcohol (SPEYERS), A., ii, 411.
- velocity of decomposition of, by hydrochloric acid (MIOLATI), A., ii, 242.

- Succinimide, action of sodium hypochlorite on (DE CONINCK), A., i, 282.
 compound of, with potassium iodide and iodine (PIUTTI), A., i, 364.
- Succinimidoacetic acid, identity of, with succinylamidoacetic acid (RADENHAUSEN), A., i, 137.
- Succinite, difference between gedanite and (HELM), A., i, 57.
- Succino-*o*-carboxyanilic acid (AUWERS and HARGER), A., i, 641.
- Succino-*o*-carboxyphenylamide (AUWERS and HARGER), A., i, 641.
- Succinodiphenylaminic acid (AUWERS and HARGER), A., i, 641.
- Succinoethylanilic acid (AUWERS and HARGER), A., i, 641.
- Succinoethylanilide (AUWERS and HARGER), A., i, 641.
- Succinomethylanilic acid (AUWERS and HARGER), A., i, 641.
- Succinomethylanilide (AUWERS and HARGER), A., i, 641.
- Succino- α -naphthalide, diacetyl derivative of (BOETTINGER), A., i, 443.
- Succino- β -naphthalide (GASSMANN), A., i, 487; (AUWERS and HARGER), A., i, 641.
- Succino- α -naphthil (BOETTINGER), A., i, 443.
- Succino- β -naphthil (GASSMANN), A., i, 487; (AUWERS and HARGER), A., i, 641.
- Succino- β -naphthilic acid (AUWERS and HARGER), A., i, 641.
dibromo- (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Succino-*o*-nitranil (AUWERS and HARGER), A., i, 641.
- Succino-*p*-nitranil (AUWERS and HARGER), A., i, 641.
- Succino-*o*-nitranilic acid (AUWERS and HARGER), A., i, 641.
- Succino-*p*-nitranilic acid (AUWERS and HARGER), A., i, 641.
- Succinotetraphenyldiamide (AUWERS and HARGER), A., i, 641.
- Succino-*p*-tolil (AUWERS and HARGER), A., i, 640.
- Succino-*p*-tolilic acid (AUWERS and HARGER), A., i, 640.
dibromo- (AUWERS, SCHIFFER, and SINGHOF), A., i, 644.
- Succino-*p*-tolylamide (AUWERS and HARGER), A., i, 640.
- Succinuric acid (DUNLAP), A., i, 471.
- Succinylacetoxylamine (ERRERA), A., i, 209, 286.
- Succinylamidoacetic acid, ethylic salt (RADENHAUSEN), A., i, 137.
- Succinylazoimide (CURTIUS), A., i, 35.
- Succinylhydroxamic acid (ERRERA), A., i, 209, 286.
- Succinylhydroxylamine, and the action of alcoholic ammonia on (ERRERA), A., i, 209.
- Succinyltropeine (MERCK), A., i, 65.
- Suprarenal capsules, toxic substance in (GOURFEIN), A., ii, 49.
- Sugar as a source of muscular energy (SEEGEN), A., ii, 487.
 in the blood, influence of ligaturing the intestinal arteries on (TANGL and HARLEY), A., ii, 47.
 formation of, in the liver (MOSSE), A., ii, 617.
 causes of formation of, in liver after death (PAVY), A., ii, 665.
 absence of, in normal urine (JOHNSON), A., ii, 199.
 in hops (BEHRENS), A., ii, 207.
 presence of, in *Pangium edule* (TREUB), A., ii, 327.
 in fruit juices (KREMLA), A., ii, 62.
 formed in the autodigestion of yeast (SALKOWSKI), A., ii, 202.
 effect of, on germination of plants (PRIANISCHNIKOFF), A., ii, 380.
 test for, in urine (JOHNSON), A., ii, 199.
 estimation of, in blood (REID), A., ii, 678.
- Sugar, cane- (*sucrose*), action of lead acetate on the rotatory power of (SVOBODA), A., i, 406.
 heat of solution of, in water (SPEYERS), A., ii, 411.
 freezing points of aqueous solutions of (PONSOT), A., ii, 412.
 freezing points of dilute solutions of (JONES), A., ii, 155; (WILDERMANN), A., ii, 351; (ABEGG), A., ii, 588.
 density of very dilute solutions of (KOHLRAUSCH), A., ii, 90.
 oxidation of (HICKS), A., i, 136, 137; (PHIPSON), A., i, 137; (SEARLE and TANKARD), A., i, 137.
 action of glyoxylic acid on (BOETTINGER), A., i, 5.
 action of oxalic acid on (KIERMAYER), A., i, 144.
 fermentation of, with different yeasts (HIEPE), A., ii, 320.
 hydrolysis of (O'SULLIVAN), A., i, 334.
 hydrolysis of, under pressure by acids (ROTHMUND), A., ii, 594.
 inversion of, by salts (LONG), A., ii, 414.
 inversion of, by micro-organisms (FERMI and MONTESANO), A., ii, 493.

Sugar, cane-, digestion of (BOURQUELOT and GLEY), A., ii, 315.
 reducing power of, on ammoniacal silver nitrate (HENDERSON), T., 150; P., 1896, 9.

Sugar, cane-, estimation of (O'SULLIVAN), A., i, 334.
 estimation of, in malt (JALOWETZ), A., ii, 225.
 estimation of, in syrups, &c. (PY), A., ii, 342.

Beet sugar, estimation of pentoses and pentosans in (STIFT), A., ii, 79.

Sugar, invert-, action of limewater on (WINTER), A., i, 11.
 estimation of, influence of the two lead acetates on the (BORNTRÄGER), A., ii, 278.

Sugar-bush (*Protea mellifera*), constituents of (HESSE), A., i, 495.

Sugars, raw, estimation of crystallisable sugars in (STROHMER and STIFT), A., ii, 505.
 and beet sugars, estimation of water in (GUNNING), A., ii, 453.

Sugars, fermentation of, by Friedländer's pneumococcus (GRIMBERT), A., ii, 322.
 action of alkalis on (DE BRUYN and VAN EKENSTEIN), A., i, 116.
 transformation of, by lead hydroxide (DE BRUYN and VAN EKENSTEIN), A., i, 588.
 behaviour of solutions of, with basic lead acetate (SVOBODA), A., i, 406.
 ammoniacal derivatives of (DE BRUYN and VAN LEENT), A., i, 118, 119.
 compounds of aminoguanidine with the (WOLFF), A., i, 78, 79.
 compounds of, with mercaptans (LAWRENCE), A., i, 272.

Sugars. See also:—
 Adonitol.
 Araban.
 Arabinose.
 Arabitol.
 Cane-sugar (sucrose).
 Dextrose.
 Diglucose.
 Dulcitol.
iso-Dulcitol.
 Fructose (levulose).
 Galactan.
 Galactose.
 α -Galaheptose and β -galaheptose.
 Galaoetose.
 Glucoheptitol.
 Glucose.
 Glycerose.
 Lactose.

Sugars. See:—
 Levulose.
 Lyxose.
 Maltose and *isomaltose*.
 Mannan.
 Mannitol.
 Mannose and *d*-mannose.
 Metamaltose.
 Methyltetrose.
 Raffinose.
 Rhamnose and *isorhamnose*.
 Sorbitol.
 Volemitol.
 Xylose.

Sulla. See Agricultural chemistry (Appendix).

3-Sulphamidobenzamide, 5-bromo- (BOETTINGER), A., i, 438.

3-Sulphamidobenzoic acid, 5-bromo-, sodium salt of (BOETTINGER), A., i, 438.

p-Sulphamidobenzoic acid (REMSEN and MUCKENFUSS), A., i, 481.

iso-p-Sulphamidobenzoic acid and its barium salt (REMSEN and MUCKENFUSS), A., i, 482.

p-Sulphaminebenzoic chloride, phosphochloro- (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 372.

p-Sulphanilic acid, absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
 estimation of (BRENZINGER), A., ii, 396.
 estimation of, in presence of *m*-sulphanilic acid (BRENZINGER), A., ii, 397.

p-Sulphanilidobenzoic acid and its salts (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.

Sulphanisic acid, preparation of (HOFMANN LECTURE), T., 697.

Sulphates. See under Sulphur.

Sulphides. See under Sulphur.

Sulphites. See under Sulphur.

Sulpho-derivatives, poisonous effect of, on algæ and infusoria (BOKORNY), A., ii, 669.

3-Sulphobenzoic acid, 4-bromo-, dichloride of (BOETTINGER), A., i, 372.
 ethylic hydrogen salt of (BOETTINGER), A., i, 372.

5-bromo- (BOETTINGER), A., i, 438.

p-Sulphobenzoic acid and its ammonium salt (REMSEN and MUCKENFUSS), A., i, 482.
 acid ammonium salt of (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 372.

Sulphocarbonilide, preparation of (HOFMANN LECTURE), T., 649, 652.

3-Sulphochlorobenzoic acid, 5-bromo- (BOETTINGER), A., i, 438.
 3-Sulphochlorobenzoic chloride, 5-bromo- (BOETTINGER), A., i, 438.
 Sulphohydrazimethylenecarboxylic acid, behaviour of potassium ethylic salt of, towards diazobenzene acetate and diazobenzene (VON PECHMANN), A., i, 678.
 Sulphohydrazimethylenedisulphonic acid, potassium salts of (VON PECHMANN and MANCK), A., i, 15, 16.
 Sulphonal as a cause of hæmatoporphyria (GARROD and HOPKINS), A., ii, 264.
 Sulphonaphthalene-1 : 4'-dicarboxylic acid, barium salt (MORO), A., i, 568.
 Sulphonaphthylphosphinic acid, from the sulphonic acid of α -naphthylie phosphate (REVERDIN and KAUFFMANN), A., i, 176.
 $\alpha\beta$ -Sulphonedipropionic acid (LOVÉN), A., i, 413.
 β -Sulphonedipropionic acid and its ethylic salt (LOVÉN), A., i, 412.
 Sulphonefluorescein, action of bromine and of phosphorus pentachloride on (WHITE), A., i, 49.
 Sulphones. See :—
 Allyl- α -naphthylsulphone.
 Benzenesulphonecasparagine.
 Benzenesulphoneglycocine.
 ψ -Cumenesulphoneglycocine.
 1 : 2-Dihydroxyphenyl-*p*-phenylsulphone.
 1 : 4-Dihydroxyphenylsulphone.
 β -Dinaphthylpropylenedisulphone.
 Diphenyldisulphonedimethyl-*p*-phenylenediamine.
 2 : 5-Diphenyldisulphone-*p*-phenylenediamine.
 Diphenylenedisulphone.
 Diphenylene sulphide sulphone.
 Diphenylsulphone-*o*-aminophenol.
 Diphenylsulphonedithylethylenediamine.
 Diphenylsulphone-ethylenediamine.
 Diphenylsulphone-ethylene-*o*-phenylenediamine.
 Diphenylsulphonemethylene-*o*-phenylenediamine.
 Diphenylsulphone-*o*-phenylenediamine.
 Diphenylsulphone-*m*-phenylenediamine.
 Diphenylsulphonetrimethylene-phenylenediamine.
 Methanesulphonepropionic acid.
 p-Methylsulphonefluorescein.
 β -Naphthylallylsulphone.
 β -Naphthylbromopropylsulphone.
 β -Naphthylhydroxypropylsulphone.

Sulphone. See :—

β -Naphthyliodopropylsulphone.
 β -Naphthylphenylpropylenedisulphone.
 Phenazyldiphenyldisulphone.
 Phenazylphenylsulphone.
 Phenyltolylsulphone.
 Piperazine-1 : 4-diphenyldisulphone.
 Sulphonefluorescein.
 Tetraphenyldisulphone-*o*-phenylenediamine.
o- and *p*-Toluenesulphoneglycocines.
p-Tolylhydroxymethylsulphone.
 1 : 2 : 3-Trihydroxyphenylsulphone.
 Trimethylene- β -dinaphthylsulphone.
 β -Trinaphthylallyltrisulphone.
 1 : 3 : 4-Xylenesulphonecalanine.
 1 : 3 : 4-Xylenesulphoneglycocine.
o-Sulpho-*p*-toluic acid, ammonium hydrogen salt of, action of resorcinol on (JONES), A., i, 50.
 Sulphur, origin of Sicilian deposits of (SJÖGREN), A., ii, 111.
 native, from Michigan (SHERZER), A., ii, 182.
 molecular weight of, in different solvents (ORNDORFF and TERRASSE), A., ii, 357.
 spectrum of the flame of (BOHN), A., ii, 140.
 a supposed decomposition of (GROSS), A., ii, 472.
 Amidosulphonic acid, preparation of (DIVERS and HAGA), T., 1637; P., 1896, 180.
 formation of, by reduction of nitrososulphates (DIVERS and HAGA), T., 1615; P., 1896, 179.
 electrolytic conductivity of (SAKURAI), T., 1656; P., 1896, 181.
 and its salts, effect of heat on (DIVERS and HAGA), T., 1650; P., 1896, 181.
 action of, on plants and animals (LOEW), T., 1662; P., 1896, 182.
 Sulphur chloride, action of potassium bromide and iodide and ethylic iodide on (SNAPE), A., ii, 641.
 Hydrogen sulphide, action of carbonyl chloride on (BESSON), A., ii, 359.
 action of sulphuric chloride on (BESSON), A., ii, 417.
 Sulphides, detection of, in presence of polysulphides, sulphites, sulphates, and thiosulphates (BLOXAM), A., ii, 72.
 mineral, microchemical reactions of (LEMBERG), A., ii, 430.

Sulphur:—

- Sulphides, inorganic, estimation of sulphur in (JANNASCH and LEHNERT), A., ii, 542; (JANNASCH and HEIDENREICH), A., ii, 671.
 estimation of, in cyanide working solutions (BETTEL), A., ii, 277.
 Polysulphides, action of, on nitrogenous organic compounds (AUF-SCHLÄGER), A., ii, 574.
 detection of, in presence of sulphides, sulphates, thiosulphates, and sulphites (BLOXAM), A., ii, 72.
 Imidosulphonic acid, salts of (DIVERS and HAGA), T., 1620; P., 1896, 179.
 Sulphur nitride, preparation and properties of (SCHENCK), A., i, 427.
 acids containing nitrogen and (WAGNER), A., ii, 599.
 Nitrosodisulphonic (*oxysulphazotic*) acid (HANTZSCH and SEMPLE), A., ii, 95; (SABATIER), A., ii, 599, 641.
 Dinitrosulphonic (*nitroxysulphurous*) acid (HANTZSCH), A., ii, 96.
 Nitrososulphuric acid, reduction by sodium of the salts of (DIVERS and HAGA), T., 1610; P., 1896, 179.
 Sulphurous anhydride (*sulphur dioxide*), oxidation of, in presence of water (DIXON), T., 779.
 influence of, in coal-gas flames on quantitative estimations (MULDER), A., ii, 333.
 estimation of, in carbolic powders (DE KONINGH), A., ii, 275.
 estimation of, in products of combustion of coal-gas (DENNSTEDT and AHRENS), A., ii, 217.
 Sulphites, detection of, in presence of carbonates and sulphates (GIACOMELLI), A., ii, 124.
 detection of, in presence of sulphides, polysulphides, thiosulphates, and sulphates (BLOXAM), A., ii, 72.
 detection of, in presence of sulphates and thiosulphates (SMITH), A., ii, 71.
 Thionyl bromide (BESSON), A., ii, 358.
 chlorobromide (BESSON), A., ii, 358.
 Sulphuric acid, electrocapillary phenomena between mercury and dilute (GOUY), A., ii, 143.
 density of very dilute solutions of (KOHLRAUSCH), A., ii, 90.
 heat of combination of, with water in the liquid and solid states (PICKERING), A., ii, 148.

Sulphur:—

- Sulphuric acid, breaks in the heat of solution curve of (PICKERING), A., ii, 155.
 freezing points of aqueous solutions of (PONSOT), A., ii, 412.
 freezing points of dilute solutions of (WILDERMANN), A., ii, 351.
 absorption of moisture by (HAKK), P., 1896, 34.
 absorption by silk of dilute (WALKER and APPELYARD), T., 1346; P., 1896, 147.
 action of copper on (BASKERVILLE), A., ii, 474.
 acceleration of the action of hydriodic acid on hydrogen peroxide by (HARCOURT and ESSON), A., ii, 238.
 use of, in nitration (HOFMANN LECTURE), T., 695.
 methylamides of, action of nitric acid on (FRANCHIMONT), A., i, 602.
 estimation of, photometrically (HINDS), A., ii, 574.
 estimation of, by means of potassium permanganate (MORSE and CHAMBERS), A., ii, 388.
 estimation of arsenic in (HATTENSAUR), A., ii, 390.
 estimation of, in products of combustion of coal-gas (DENNSTEDT and AHRENS), A., ii, 217.
 estimation of, in hydrofluoric acid (STAHL), A., ii, 621.
 estimation of, in leather (BALLAND and MALJEAN), A., ii, 499.
 fuming, estimation of sulphuric anhydride in (DOBRINER and SCHRANZ), A., ii, 672.
 Sulphuric anhydride, estimation of, in fuming sulphuric acid (DOBRINER and SCHRANZ), A., ii, 672.
 Sulphuric chloride, action of some hydrides on (BESSON), A., ii, 417.
 Sulphates, conversion of, into chlorides (JANNASCH), A., ii, 574.
 precipitation of, by barium chloride (LUNGE), A., ii, 672.
 detection of, in presence of carbonates and sulphites (GIACOMELLI), A., ii, 124.
 detection of, in presence of sulphides, sulphites, polysulphides, and thiosulphates (BLOXAM), A., ii, 72.
 detection of, in presence of sulphites and thiosulphates (SMITH), A., ii, 71.

Sulphur :—

- Persulphuric acid, formation of, by electrolysis of sulphuric acid (ELBS and SCHÖNHERR), A., ii, 519.
- apparatus for showing the formation of (ELBS), A., ii, 519.
- estimation of, with ferrous sulphate (BERTHELOT), A., ii, 70.
- Thiosulphates, detection of, in presence of sulphides, polysulphides, sulphates, and sulphites (BLOXAM), A., ii, 72.
- detection of, in presence of sulphates and sulphites (SMITH), A., ii, 71.
- standardisation of, by iodine acid (RIEGLER), A., ii, 573.
- Polythionie acids, molecular volume, electrical conductivity, viscosity, molecular refraction, and electromotive force with different electrodes of the salts of (HERTLEIN), A., ii, 353.
- Sulphur, estimation of, in non-volatile substances (MABERY), A., ii, 387.
- estimation of, in inorganic sulphides (JANNASCH and LEHNERT), A., ii, 542; (JANNASCH and HEIDENREICH), A., ii, 671.
- estimation of, in coal and gas (MABERY), A., ii, 387.
- estimation of, in refined copper (HEATH), A., ii, 497.
- estimation of, in copper ores and pyrites (KELLER and MAAS), A., ii, 498.
- estimation of, in iron, apparatus for (READ), A., ii, 274.
- estimation of, in cast-iron or steel (BOUCHER), A., ii, 671.
- estimation of, in white cast-iron (PHILLIPS), A., ii, 498.
- estimation of, in pig-iron (AUCHY), A., ii, 543.
- estimation of, in pyrites (ASBÓTH), A., ii, 71; (LUNGE), A., ii, 498; (GLADDING), A., ii, 622.
- estimation of, in zinc (FUNK), A., ii, 274.
- estimation of, in organic compounds (MABERY and BYERLEY), A., i, 329; (ASBÓTH), A., ii, 448.
- estimation of, in oil of mustard (FOERSTER), A., ii, 452.
- Sumach, myricetin, the colouring matter of (PERKIN and ALLEN), T., 1299; P., 1896, 157.
- Sunflower, edestin in (OSBORNE and CAMPBELL), A., i, 716.
- Superphosphates. See Phosphorus and Agricultural chemistry (Appendix).

- Surface tension, effects on broken crystals of their (LEHMANN), A., ii, 160.
- Syenite from Montana (WEED and PIRSSON), A., ii, 192.
- mica-, from Saxony (HENDERSON), A., ii, 533.
- Sylvanite from Cripple Creek, Colorado (PEARCE), A., ii, 612, 613.
- Symbiosis and assimilation of nitrogen, relation of (STOKLASA), A., ii, 204.
- Symmetry and asymmetry, molecular (GROTH), A., ii, 159; (LADENBURG), A., ii, 244.
- Symphoricarpos racemosus*, detection of proteosomes in (LOEW), A., ii, 58.
- "Syntagmatite" (ADAMS and HARRINGTON), A., ii, 374.
- Syrups, estimation of levulose in (WILEY), A., ii, 342.
- estimation of sucrose, glucose, and gelose in (PY), A., ii, 342.
- Systematic chemistry, L. Meyer's papers on (BEDSON), T., 1421; P., 1896, 119.

T.

- Talc from New Mexico (PACKARD), A., ii, 530.
- from Ontario (HOFFMANN), A., ii, 258.
- Tallow, estimation of the acetyl numbers of (SPAETH), A., ii, 454.
- Tannage chrome, analysis of used liquors from (HEAL and PROCTOR), A., ii, 393.
- Tannic acid, optical activity and constitutional formula of (SCHIFF), A., i, 370.
- Tannin in bark of *Myrica nagi* (PERKIN and HUMMEL), T., 1294; P., 1896, 145.
- non-formation of, in fungi (NAUMANN), A., ii, 538.
- use of, in dyeing (HOFMANN LECTURE), T., 608.
- estimation of, by copper (ROSS), A., ii, 501.
- estimation of, in wine (MANCEAU), A., ii, 282.
- Tanning matter, estimation of (PROCTER), A., ii, 403.
- Tantalite from Finland (CHRIST-SCHOFF), A., ii, 567.
- Tantalum fluoride (PICCINI), A., ii, 178.
- separation of niobium from (PENNINGTON), A., ii, 305.
- Taraxacum officinalis*, optimum temperature for the respiration of (ZIEGENBEIN), A., ii, 265.

- Tariric acid, action of phosphorus and hydriodic acid on (ARNAUD), A., i, 522.
- Tarnowitzite from Silesia (TRAUBE), A., ii, 255.
- Tartar, estimation of, in wine (HAAS), A., ii, 583.
- Tartar, cream of, analysis and composition of (ALLEN), A., ii, 584.
- Tartaric acid, formation of, by oxidation of cane sugar (PHIPSON), A., i, 137.
- freezing points of dilute solutions of (ABEGG), A., ii, 588.
- absorption by silk of dilute (WALKER and APPLEYARD), T., 1346; P., 1896, 147.
- and alkali tartrates, action of, on various salts (DE LA SOURCE), A., i, 206, 207.
- action of formaldehyde and hydrochloric acid on (HENNEBERG and TOLLENS), A., i, 645.
- oxidation of, in presence of ferrous iron (FENTON), T., 546; P., 1896, 67.
- Tartaric acid, caesium and rubidium salts, rotatory power of, in the crystalline and solid states (TRAUBE), A., ii, 509.
- lead potassium salt, constitution of (KAHLENBERG), A., ii, 6.
- ferrous salt, behaviour of, in air (FENTON), T., 547.
- ethylic salt, behaviour of, towards phenylic isocyanate (HALLER), A., i, 33.
- disodium compound, action of ethylic chloride on (MULDER), A., i, 281.
- Tartaric acid, detection of, by resorcinol (DENIGÈS), A., ii, 80.
- detection of, in presence of nitrates, nitrites, and chlorates (DENIGÈS), A., ii, 332.
- estimation of, in wine (HAAS), A., ii, 583.
- d*-Tartaric acid, configuration of (FISCHER), A., i, 525.
- laevo- and inactive amylic salts, rotatory power of the (WALDEN), A., ii, 139.
- l*-Tartaric acid, preparation of, by means of the cinchonine salt (MARCKWALD), A., i, 207.
- meso*-Tartaric acid, rotatory power of the amylic salt of (WALDEN), A., ii, 633.
- Tartaric acid: Racemic acid, amylic salt, rotatory power of (WALDEN), A., ii, 633.
- laevo-amylic salt, rotatory power of the (WALDEN), A., ii, 139.
- Tartaryl- α -naphthalide, tetraacetyl derivative of (BOETTINGER), A., i, 443.
- Tartaryl- β -naphthalide, acetyl and diacetyl derivatives of (GASSMANN), A., i, 487.
- Tartrazin, behaviour of, towards diazo-compounds (GNEHM and BENDA), A., i, 678.
- Tartronamide and the biuret reaction (SCHIFF), A., i, 632.
- Tartronylurca. See Dialuric acid.
- Tartryltartaric acid, decomposition products of (MULDER), A., i, 281.
- Tartryltropeine (MERCK), A., i, 65.
- Taurocholic acid, crystalline, preparation of, from ox-bile (RICHTER), A., i, 111.
- Tautomerism (MARCKWALD), A., i, 29; (VON PECHMANN), A., i, 31.
- Tea extract, isolation of adenine, theobromine, and a new base from (KRÜGER), A., i, 450.
- estimation of caffeine in (PETIT and TERRAT), A., ii, 629.
- Teeth, composition of the enamel of (TOMES), A., ii, 315.
- Tellurium, atomic weight of (STAUDENMAIER), A., ii, 97.
- atomic weight of Japanese (CHIKASHIGÉ), T., 881; P., 1896, 151.
- position of, in the periodic system (RETGERS), A., ii, 520.
- Telluric acid, preparation of (STAUDENMAIER), A., ii, 96.
- Tellurium minerals from Cripple Creek, Colorado (PEARCE), A., ii, 612, 613; (KNIGHT), A., ii, 613.
- Tellurium, separation of, from copper residues (WHITEHEAD), A., ii, 164.
- Temperature. See Heat.
- Tennantite from Salzburg (SCHWAGER and GÜMBEL), A., ii, 431.
- Tenorite after euprite from Russia (JEREMÉEFF), A., ii, 566.
- Tension of saturated vapour. See Heat, vapour pressure.
- Tephrite, nepheline-leucite-, from Bolivia (HIBSCH), A., ii, 117.
- Terbia, a probable new element in (DE BOISBAUDRAN), A., ii, 249.
- Terebic acid, refraction equivalent of (ANDERLINI), A., ii, 229.
- from α -pinonic acid (VON BAeyer), A., i, 308.
- from the oxidation of sobreritritol (GINZBERG), A., i, 446.
- from terpenylic acid (MAHLA and TIEMANN), A., i, 385.
- Terephthalic acid from the oxidation of camphene (MARSH and GARDNER), T., 84; P., 1895, 206.

- Terephthalic acid, ethylic salt, magnetic rotatory power, &c., of (PERKIN), T., 1132, 1178, 1238.
tetrabromo- (RUPP), A., i, 618.
tetrachloro- (RUPP), A., i, 618.
tetriodo- (RUPP), A., i, 618.
- Terephthalylazoimic acid, ethylic salt (CURTIUS and DAVIDIS), A., i, 681.
- Terephthalylazoimide (CURTIUS and DAVIDIS), A., i, 681.
- Terephthalylhydrazide, hydrochloride, formylidene, isopropylidene, and benzylidene derivatives of (CURTIUS and DAVIDIS), A., i, 681.
- Terephthalylhydrazineacetoacetic acid, ethylic salt (CURTIUS and DAVIDIS), A., i, 681.
- Terephthalylhydrazinic acid, ethylic salt, hydrochloride, sodium and benzylidene derivatives of (CURTIUS and DAVIDIS), A., i, 681.
- Terpene, $C_{10}H_{16}$, from Charas (WOOD, SPIVEY, and EASTERFIELD), T., 541; P., 1896, 76.
- Terpene hydrate from limonene hydrochloride (KREMERS), A., i, 177.
- Δ^4 -Terpene, 1-bromo- (VON BAEYER and BLAU), A., i, 53.
 nitrosobromide (VON BAEYER and BLAU), A., i, 53.
 compounds from (VON BAEYER and BLAU), A., i, 53.
- Terpenes from oil of lignaloes (BARBIER and BOUVEAULT), A., i, 55.
 behaviour of, towards trichloroacetic acid (REYCHLER), A., i, 308.
- Δ^4 -Terpenol acetate, nitrosobromide (VON BAEYER and BLAU), A., i, 53.
 compounds from (VON BAEYER and BLAU), A., i, 53.
 nitrosochloride, compound from (VON BAEYER and BLAU), A., i, 54.
- Terpenone, $C_{10}H_{16}O$, from bisnitrosotetrahydrocarvone, and its semicarbazone (VON BAEYER), A., i, 248.
- Terpenylic acid (FITTIG and WOLFF), A., i, 135.
 from oxidation of sobreritritol (GINZBERG), A., i, 446.
 from pinoylformic acid (VON BAEYER), A., i, 621.
 oxidation and constitution of (MAHLA and TIEMANN), A., i, 385.
- Terpin hydrate from carvene (REYCHLER), A., i, 308.
- Terpineol, conversion of, into dipentene, and terpinolene (WALLACH), A., i, 572.
 nitrosochloride, behaviour of, towards halogen hydrides (VON BAEYER), A., i, 246.
- Terpineol nitrosochloride, conversion of, into hydroxydihydrocarvoxime (WALLACH), A., i, 571.
- Terpinolene, from terpeneol (WALLACH), A., i, 572.
- Tetrabenzoylfisetin (PERKIN and GUNNELL), T., 1305; P., 1896, 158.
- Tetrabenzoylluteolin (PERKIN), T., 210; P., 1896, 37.
- exo*-Tetracetodiamido-*p*-xylene (LUSTIG), A., i, 164.
- Tetracetylaconine, preparation and hydrolysis of (DUNSTAN and CARR), P., 1895, 178.
- Tetracetyldibromoluteolin (PERKIN), T., 210; P., 1896, 37.
- Tetracetylethane? from sodioacetylacetone (ZANETTI), A., i, 249.
- Tetracetylfisetin (PERKIN and GUNNELL), T., 1305; P., 1896, 158.
- Tetracetyl- β -galactochloral (HANRIOT), A., i, 519.
- Tetracetyluteolin (PERKIN), T., 210; P., 1896, 37.
- Tetracetylrammonic nitrile, and the action of silver oxide on it (FISCHER), A., i, 525, 526.
- Tetracetylsuccinylhydroxamic acid (ERRERA), A., i, 286.
- Tetracetyltartaryl- α -naphthalide (BOETTINGER), A., i, 443.
- Tetracetylxylose (BADER), A., i, 336.
- Tetradecylacetylene. See Hexadecylinenes.
- Tetragophosphite from Sweden (IGELSTRÖM), A., ii, 308.
- Tetrahedrite from New South Wales (LIVERSIDGE), A., ii, 657.
 argentiferous, from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- Tetrahydroacetophenone. See *cyclo*-Hexenyl methyl ketone.
- Tetrahydro-1 : 3 : 5-carvacrol. See 1-Methyl-3-isopropylcyclohexen-5-ol.
- Tetrahydrocarveol, active, from phellandrene nitrite (WALLACH and HERBIG), A., i, 101.
- Tetrahydrocarvone derivatives from phellandrene (WALLACH and HERBIG), A., i, 101.
- Tetrahydrocarvonebisnitrosylic acid, from bisnitrosotetrahydrocarvone (VON BAEYER), A., i, 248.
 bromo- (VON BAEYER), A., i, 246.
- Tetrahydrocarvylamine, active, from phellandrene nitrite: its hydrochloride, carbamide, phenylcarbamide, and acetyl derivative (WALLACH and HERBIG), A., i, 101.
- Tetrahydrocinchonidine nitrosanitrite and other salts (KONEK VON NORWALL), A., i, 395.

- Tetrahydro-*m*-cresol. See 1-Methyl-*cyclohexenol*-5.
- Tetrahydroeumic acid. See 4-*iso*-Propyl*cyclohexenecarboxylic* acid.
- Tetrahydro- ψ -eumenecarboxylic acid. See Campholenic acid.
- Tetrahydrocymene. See 1 : 4-Methyl-propyl*cyclohexene*.
- Tetrahydro-1 : 3-dimethylphenethyl-*oic*-4-acid. See Campholenic acid.
- Tetrahydronaphthalene-1 : 4'-dicarboxylic acid, barium, and calcium salts (MORO), A., i, 568.
- ar*-Tetrahydro- α -naphthylamine, magnetic rotatory power, &c., of (PERKIN), T., 1104, 1106, 1213, 1245.
- ac*-Tetrahydro- β -naphthylamine, magnetic rotatory power, &c., of (PERKIN), T., 1104, 1106, 1213, 1245.
- 1- β -Tetrahydronaphthyl-3-cyanotrimethylpiperidone (BENEDICENTI), A., i, 488.
- Tetrahydro- β -naphthylloxamic acid (BENEDICENTI), A., i, 488.
- Tetrahydro- α -naphthylpiperidine and its hydrochloride, mercuriochloride, and ferrocyanide, &c. (ABEL), A., i, 254.
- Tetrahydro- β -naphthylpiperidine and its hydrochloride, platinochloride, aurochloride, and picrate (ROTH), A., i, 497.
- Tetrahydrophthalic acids. See *cyclo*-Hexenedicarboxylic acids.
- Tetrahydroquinaeridine (NIEMEN-TOWSKI), A., i, 261.
- Tetrahydroquinidine nitrosonitrite (KONEK VON NORWALL), A., i, 395.
- Tetrahydroquinine and its acetyl derivative (LIPPMANN and FLEISSNER), A., i, 63.
- nitrosonitrite (KONEK VON NORWALL), A., i, 395.
- Tetrahydroquinoline, magnetic rotatory power, &c., of (PERKIN), T., 1117, 1214, 1245.
- Tetrahydrotoluene. See Methyl*cyclohexene*.
- Tetrahydroxydecoic acid (KROMER), A., i, 386.
- 2 : 4 : 2' : 4'-Tetrahydroxydiphenylacetic acid (HEWITT and POPE), T., 1268, 1269 ; P., 1896, 151.
- lactone of, and its triacetyl derivative (HEWITT and POPE), T., 1267, 1269 ; P., 1896, 151.
- Tetrahydro-1 : 3 : 5-xlenol. See 3 : 5-Dimethyl*cyclohexenol*.
- Tetrahydro-*p*-xylic acid [3 : 4]. See VOL. LXX. ii.
- 3 : 4-Dimethyl*cyclohexenecarboxylic* acid.
- Tetrallylammonium hydroxide (ORLOFF), A., i, 634.
- aluminium alum, action of heat on (ORLOFF), A., i, 634.
- chromium alum (ORLOFF), A., i, 634.
- 5 : 5 : 5 : 5-Tetramethoxy-4 : 4 : 4 : 4-tetramethyltetraphenylethylene (GATTERMANN), A., i, 173.
- 4 : 4 : 4 : 4-Tetramethoxytetraphenylethylene (GATTERMANN), A., i, 173.
- oxide (GATTERMANN), A., i, 173.
- 5 : 5 : 5 : 5-Tetramethoxytetraphenylethylene, 4 : 4 : 4 : 4-tetrachloro- (GATTERMANN), A., i, 173.
- Tetramethylacetonedicarboxylic acid, ethylic salt (PETRENKO-KRITSCHENKO, PISSARSCHESKY, and HERSCHKOWITSCH), A., i, 135.
- Tetramethyldiamino- α -azonaphthalene, reduction of ; its pierate (CONN), A., i, 100.
- Tetramethylaminodiphenoxazinium chloride [N : O : NMe₂Cl = 1 : 2 : 4 ; N : O : NMe₂ = 1 : 2 : 4] (MÖHLAU and UHLMANN), A., i, 168.
- iodide [N : O : NMe₂I = 1 : 2 : 4 ; N : O : NMe₂ = 1 : 2 : 4] (MÖHLAU and UHLMANN), A., i, 168.
- Tetramethylaminotetraphenylethylene (GATTERMANN), A., i, 174.
- Tetramethyldiaminotriphenylcarbinol, dichloro-, salts of the colour base derived from (GNEHM and BÄNZIGER), A., i, 433.
- Tetramethyldiaminotriphenylmethane, nitro-, reduction of (PRUD'HOMME), A., i, 484.
- Tetramethylammonium hydroxide.
- action of heat on (HOFMANN LECTURE), T., 666.
- iodide, preparation of (HOFMANN LECTURE), T., 666.
- Tetramethylaniline, nitrile and *iso*-nitrile obtained from (HOFMANN LECTURE), T., 710.
- Tetramethylapionol (CIAMICIAN and SILBER), A., i, 608.
- Tetramethylazoxyaniline (BÖRNSTEIN), A., i, 541.
- Tetramethylbenzene. See Durene.
- Tetramethylbenzoic acids (CLAUS), A., i, 230.
- sym*-Tetramethylbenzoylpropionic acid (MÜHR), A., i, 232.
- Tetramethyldehydrobrazilin (HERZIG), A., i, 379.
- Tetramethyldehydrohæmatoxylin and its acetyl derivative (HERZIG), A., i, 379.

- 3 : 5 : 3' : 5'-Tetramethyldiphenyl, 2 : 2'-diamino-, and its salts and diacetyl derivative (KERSCHBAUM), A., i, 162.
- Tetramethyldiphenylimide and its picrate (KERSCHBAUM), A., i, 162.
- 2 : 7 : 2' : 7'-Tetramethyldixanthylene (GURGENJANZ and KOSTANECKI), A., i, 52.
- 4 : 5 : 4' : 5'-Tetramethyldixanthylene (GURGENJANZ and KOSTANECKI), A., i, 52.
- Tetramethylene-1 : 3-dioxalylic acid. See *cyclo*-Butane-1 : 3-dioxalylic acid.
- Tetramethylethylene. See Hexylenes.
- Tetramethylethylenelactic acid. See β -Hydroxytetramethylpropionic acid.
- Tetramethyloxamide, action of nitric acid on (FRANCHIMONT), A., i, 602.
- Tetramethylpropylpseudonitrole. See Heptanediisopropylmethane, γ -nitro- γ -nitroso-.
- Tetramethylpyrazine and its salts (BRANDES and STOEHR), A., i, 576.
- Tetramethylsuccinamide (THIELE and HEUSER), A., i, 342.
- Tetramethylsuccinic acid (THIELE and HEUSER), A., i, 342.
- benzidine derivative of (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- o*-phenylenediamine derivative of (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- Tetramethylsuccinic acid, ethylic salt (THIELE and HEUSER), A., i, 342.
- hydrogen ethylic salt (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- methylic salt (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- hydrogen methylic salt (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- Tetramethylsuccinic anhydride (THIELE and HEUSER), A., i, 342; (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- Tetramethylsuccino- β -naphthyl (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- Tetramethylsuccinonitrile (THIELE and HEUSER), A., i, 342.
- Tetramethylsuccino-*p*-tolyl (AUWERS, SCHIFFER, and SCHLOSSER), A., i, 640.
- Tetramines, discovery of (HOFMANN LECTURE), T., 687.
- Tetramylammonium hydroxide, action of heat on (HOFMANN LECTURE), T., 666.
- Tetramylammonium iodide (HOFMANN LECTURE), T., 666.
- Tetraphenoxyquinol (JACKSON and GRINDLEY), A., i, 155.
- Tetraphenoxyquinone (JACKSON and GRINDLEY), A., i, 155.
- 1 : 3 : 4 : 6-Tetraphenyldihydropyridazine, benzoyl derivative of, and additive product with nitrous acid (SMITH and RANSOM), A., i, 322.
- Tetraphenyldiphenylenepropene (KLINGER and LONNES), A., i, 375.
- Tetraphenyldiphenylenepropylene oxide (KLINGER and LONNES), A., i, 375.
- Tetraphenyldiphenylenetrioxyethylene (KLINGER and LONNES), A., i, 375.
- Tetraphenyldisulphoneorthophenylenediamine (HINSBERG and STRUPLER), A., i, 47.
- Tetraphenylene-ethylene. See Bidi-phenylene-ethylene.
- Tetraphenylene-ethylene dioxides. See Dixanthylenes.
- Tetraphenylenepinacolin. See Bidi-phenylene-ethylene oxide.
- Tetraphenylmelamine, preparation of (HOFMANN LECTURE), T., 716.
- Tetraphenyl-*p*-tolyl diguanide: its hydrochloride and platinochloride (MARCKWALD), A., i, 30.
- 4 : 4 : 4 : 4-Tetrapropoxytetraphenyl-ethylene (GATTERMANN), A., i, 173.
- Tetrapyridine cobaltous chloride (REIZENSTEIN), A., i, 316.
- nickelous chloride (REIZENSTEIN), A., i, 316.
- Tetra-*o*-tolylphenyldiguanide: its hydrochloride and platinochloride (MARCKWALD), A., i, 31.
- Tetrazine derivative, $C_{14}H_{12}N_4O_2$, from ethylic diphenylcarbazonocarboxylate (RUPE), A., i, 429.
- Tetrazole, electrolytic conductivity of solutions of (BAUR), A., ii, 144.
- and its sodium and barium derivatives (THIELE and INGLE), A., i, 108.
- 5-amino-, and its cyanate and acetyl and benzoyl derivatives (THIELE and INGLE), A., i, 107.
- Tetrazones (CURTIUS), A., i, 339.
- Tetrazotic acid, amino-, electrolytic conductivity of, in solution (BAUR), A., ii, 144.
- electrolytic conductivity of solutions of the sodium salt of (BAUR), A., ii, 144.
- Tetrazylazoimide: its silver and ammonium derivatives (THIELE and INGLE), A., i, 107.

- Tetrazylhydrazine hydrochloride, action of potassium cyanate and of acetophenone on (THIELE and INGLE), A., i, 107.
- Tetrazylsemicarbazide (THIELE and INGLE), A., i, 107.
- 4 : 4 : 4 : 4-Tetrethoxytetraphenylethane (GATTERMANN), A., i, 173.
- 4 : 4 : 4 : 4-Tetrethoxytetraphenylethylene (GATTERMANN), A., i, 173.
- 5 : 5 : 5 : 5-Tetrethoxy-4 : 4 : 4 : 4-tetramethyltetraphenylethylene (GATTERMANN), A., i, 173.
- 5 : 5 : 5 : 5-Tetrethoxytetraphenylethylene, 4 : 4 : 4 : 4-tetrachloro- (GATTERMANN), A., i, 173.
- Tetrethylaminodiphenoxazinium chloride [$N : O : NEt_2Cl = 1 : 2 : 4$; $N : O : NEt_2 = 1 : 2 : 4$] (MÖHLAU and UHLMANN), A., i, 168.
- iodide [$N : O : NEt_2I = 1 : 2 : 4$; $N : O : NEt_2 = 1 : 2 : 4$] (MÖHLAU and UHLMANN), A., i, 168.
- Tetrethylammonium hydroxide, discovery of (HOFMANN LECTURE), T., 665.
- action of heat on (HOFMANN LECTURE), T., 666.
- action of ethylic iodide on (HOFMANN LECTURE), T., 666.
- iodide, discovery of (HOFMANN LECTURE), T., 664.
- action of zinc ethyl on (LACHMANN), A., i, 460.
- triiodide (LACHMANN), A., i, 460.
- Tetrethyl-diamino- α -azonaphthalene and its pierate (COHN), A., i, 100.
- Tetrethylphosphonium hydroxide, preparation of (HOFMANN LECTURE), T., 672.
- iodide, discovery of (HOFMANN LECTURE), T., 602.
- preparation of (HOFMANN LECTURE), T., 672.
- Tetrethylthiodiamine (SCHENCK), A., i, 427.
- Tetric acid (*tetric acid*, *methyltetric acid*) (WOLFF), A., i, 87; (FREER), A., i, 277, 278.
- action of nitrous acid on (WOLFF and SCHWABE), A., i, 524.
- oxidation products of (WOLFF), A., i, 87.
- Tetric acid, anilide of, and its nitroso-derivatives (WOLFF), A., i, 87.
- benzoyl derivative (FREER), A., i, 278.
- Tetric acid, bromo-, and its decomposition products (WOLFF), A., i, 87.
- nitroso- (WOLFF), A., i, 88.
- Tetric chloride (FREER and MILLER), A., i, 278.
- Tetric acid. See Tetric acid.
- Tetrolic acid, formation of, from zinc and $\alpha\beta$ -dichlorocrotonic acid (SZENIC and TAGGESELL), A., i, 81.
- action of water on (DESGREZ), A., i, 2.
- Tetric acid (WOLFF), A., i, 87.
- hydrazone and benzoyl derivative of (WOLFF and SCHWABE), A., i, 523.
- oxime of (WOLFF and SCHWABE), A., i, 524.
- Tetric acid, bromo- (WOLFF and SCHWABE), A., i, 522.
- action of nitrous acid on (WOLFF and SCHWABE), A., i, 524.
- reduction product of (WOLFF and SCHWABE), A., i, 523.
- dibromo-, action of ammonia on (WOLFF and SCHWABE), A., i, 524.
- spontaneous decomposition of (WOLFF and SCHWABE), A., i, 523.
- Thallium, solution and diffusion of, in mercury (HUMPHREYS), T., 1681; P., 1896, 220.
- vapour density of (BILZ), A., ii, 152.
- a new mineral (lorandite) containing (KRENNER), A., ii, 30.
- physiological action of (CURCI), A., ii, 491.
- Thallium hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
- peroxide electrodes in galvanic cells (TOWER), A., ii, 142.
- perthiomolybdate (HOFMANN), A., ii, 476.
- Thallous fluoroxyhypomolybdate (MAURO), A., ii, 248.
- fluoroxymolybdate (MAURO), A., ii, 248.
- Thammasite from New Jersey (PENFIELD and PRATT), A., ii, 367; (PISANI), A., ii, 530.
- Thenardite (?) from Argentina (SCHICKENDANTZ), A., ii, 480.
- Theobromine, action of potassium hydroxide on (FISCHER), A., i, 12, 13.
- compound of, with adenine in tea (KRÜGER), A., i, 450.
- behaviour of, in the organism (ALBANESE), A., ii, 319.
- physiological action of (ALBANESE), A., ii, 492.
- periodides, preparation and properties of (SHAW), T., 102; P., 1895, 177.

- Theobromine, estimation of, in presence of caffeine (DENIGÈS), A., ii, 387.
- Theophylline, production of, from chlorothicophylline and bromotheophylline (FISCHER and ACH), A., i, 263.
- bromo- (FISCHER and ACH), A., i, 263.
- chloro- : its sodium and silver derivatives (FISCHER and ACH), A., i, 263.
- Thermochemistry. See Heat.
- Thianthrene. See Diphenylene bisulphide.
- dioxide. See Diphenylene disulphoxide.
- Thiazoline μ -hydrosulphide (GABRIEL and STELZNER), A., i, 121.
- Thiazolyl μ -sulphide (GABRIEL and STELZNER), A., i, 121.
- Thiazylpropionic acid, μ -amino-, methylic salt (CONRAD and KREICHGAUER), A., i, 409.
- Thienyltriphenylmethane (WEISSE), A., i, 565.
- bromo- (WEISSE), A., i, 565.
- chloro- (WEISSE), A., i, 565.
- iodo- (WEISSE), A., i, 565.
- Thiethylimine (LENGFELD and STIEGLITZ), A., i, 79.
- Thiobiazoline, derivatives of (BUSCH), A., i, 190.
- Thiocarbanil, magnetic rotatory power, &c., of (PERKIN), T., 1124, 1204, 1244.
- Thiocarbamides, symmetrical disubstituted, action of alkali on (DIXON), T., 857; P., 1896, 100.
- Thiocarbanilide, behaviour of, towards phenylhydrazine (WALTHER), A., i, 543.
- Thiocarbimides, aliphatic, action of mercuric chloride on (PONZIO), A., i, 636.
- ethereal, synthesis of (HOFMANN LECTURE), T., 711.
- Thiocarbonic anhydride (DUNLAP), A., i, 471.
- Thiocarbonylacetoacetic acid (EMMERLING), A., i, 127.
- ethylic salt, action of lead oxide on (EMMERLING), A., i, 127.
- dibromo- and tribromo- (EMMERLING), A., i, 127.
- Thiocyanates, absence of, in the saliva of dog and horse (MUNK), A., ii, 50.
- Thiocyanobenzenediazonium chlorides. See Benzenediazonium chloride, thiocyno-.
- Thio-ether, $C_{15}H_{13}O_2NS$ (BRÜGGMANN), A., i, 356.
- Thiophen, magnetic rotatory power, &c., of (PERKIN), T., 1117, 1204, 1244.
- condensation of, with benzaldehyde (TÖHL and NÄHKE), A., i, 690.
- dinitro-, silver salt of (MEYER), A., i, 419.
- Thiophensynaldoxime acetate, velocity of formation of nitrile and acetic acid from (LEY), A., ii, 243.
- β -Thiophencarboxylic acid, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- Thiophenetyltetrahydroquinazolines. See Phenethylthiotetrahydroquinazolines.
- Thiorufic acid, probable formula of (EMMERLING), A., i, 127.
- Thiosemicarbazides and thiocarbazides, suggestions as to the nomenclature of (DIXON), T., 861.
- "Thiosinnammoniumoxydhydrat, bromo-" (DIXON), T., 21.
- Thio-derivatives. See :—
- Acetic acid.
- Allophanic acid.
- Benzamide.
- Benzoic acid.
- Benzoic acid thionamide.
- β -Benzylcrotonic acid and β -benzylisocrotonic acid.
- Benzyloxybenzaldehyde.
- β -Benzylpropylene.
- Carbanilide (*s*-Diphenylthiocarbamide).
- o*- and *p*-Cresols (*o*- and *p*-Tolylmercaptans).
- Cyanuric acid.
- Dehydrotoluidine.
- Dimethylamine.
- Dimethyluramil.
- Diphenylamine.
- Eugenol.
- Formanilide.
- Guaiacol.
- Hydantoinacetic acid.
- Malic acid.
- Menthol.
- Methoxyphenyltetrahydroquinazoline.
- Naphthamide.
- Naphthol (4-Naphthyl mercaptan).
- Naphthyltetrahydroquinazoline.
- Phenol (Phenyl mercaptan).
- Phenoxybutyramide.
- Phenylcarbamic acid.
- Phenylcarbazinic acid bisulphide.
- Phenylcarbimide.
- Phenylsemicarbazide.
- Phenyltetrahydroquinazolines.
- Piperidine.
- Quinol.

Thio-derivatives. See :—

- Resorcinol.
- Salicylic acid.
- Sinamine (Allylthiocarbamide).
- Thymol.
- Tri-anisaldehyde.
- Tri-benzaldehyde.
- Tri-benzoylvanillin.
- Tri-cumaldehyde.
- Tri-dimethylgentisic aldehyde.
- Tri-formaldehyde.
- Tri-gentisic aldehyde.
- Tri-methylvanillin.
- Tri-piperonal.
- Tri-tolualdehyde.
- Tri-vanillin.
- Uramil.
- Veratrole anilide.
- Thorite from Norway (SCHMELCK), A., ii, 186.
- Thorium minerals in Norway (SCHMELCK), A., ii, 186.
- carbide (MOISSAN and ÉTARD), A., ii, 423.
- niobate (LARSSON), A., ii, 564.
- nitrate, commercial, examination of (FRESENIUS and HINTZ), A., ii, 677.
- oxide, new source of (PHIPSON), A., ii, 422.
- dioxide, action of phosphorus pentachloride on (SMITH and HARRIS), A., ii, 179.
- Thorium, separation of cerium from (FRESENIUS and HINTZ), A., ii, 677.
- separation of, from yttrium, lanthanum, and neodymium (FRESENIUS and HINTZ), A., ii, 677.
- Thuja obtusa*, effect of lime and magnesia on development of (LOEW and HONDA), A., ii, 446.
- Thyme oil, analysis of (HIRSCHSOHN), A., ii, 223.
- Thymic acid, barium salt, and properties of (KOSSEL and NEUMANN), A., i, 658.
- Thymin, separation of, from spermatozoa (KOSSEL), A., ii, 537.
- Thymol from dibromomenthone (BECKMANN and EICKELBERG), A., i, 313.
- magnetic rotatory power, &c., of (PERKIN), T., 1064, 1132, 1183, 1239.
- effect of, on the freezing point of dilute soda solution (GOLDSCHMIDT and GIRARD), A., i, 474.
- crystalline form of (POPE), P., 1896, 142.
- compound of, with aluminium chloride (PERRIER), A., i, 354.

- Thymol, amino-, from hydroxydihydrocarboxime (WALLACH), A., i, 571.
- p*-amino-, and its hydrochloride and acetyl and benzoyl derivatives (PLANCHER), A., i, 358.
- substance obtained from, by condensation with *m*-benzaldehyde (PLANCHER), A., i, 358.
- nitramino- (SODERI), A., i, 359.
- benzoate (SODERI), A., i, 359.
- thio- (VOSWINKEL), A., i, 379.
- Thymoquinonequinolhemiacetal (JACKSON and OENSLAGER), A., i, 294.
- Thymotic acid, nitro- (HEYL and MEYER), A., i, 146.
- Thymus gland, presence of iodine in (BAUMANN), A., ii, 487.
- Thymylic amylic ether (WELT), A., i, 333.
- Thyreo-antitoxin, separation and properties of (FRÄNKEL), A., ii, 119.
- Thyroid gland, presence of iodine in the (BAUMANN), A., ii, 263, 487.
- iodine compounds of (BAUMANN and ROOS), A., ii, 487.
- extraction of thyreo-antitoxin from (FRÄNKEL), A., ii, 119.
- Thyroidin (BAUMANN), A., ii, 263, 487; (BAUMANN and ROOS), A., ii, 487.
- properties and compounds of (BAUMANN and ROOS), A., ii, 487.
- physiological action of (ROOS), A., ii, 488.
- Tiffanyite (KUNZ), A., ii, 306.
- Tin, specific heat of (BARTOLI and STRACCIATI), A., ii, 145.
- rate of diffusion of, in mercury (HUMPHREYS), T., 251; P., 1896, 9.
- veins, formation of (GAUTIER), A., ii, 529.
- Tin-alloys with copper (FOERSTER), A., ii, 177.
- solution and diffusion in mercury of (HUMPHREYS), T., 1682; P., 1896, 220.
- with lead, solution and diffusion of, in mercury (HUMPHREYS), T., 1681; P., 1896, 220.
- with nickel and aluminium (GAUTIER), A., ii, 602.
- with silver, melting points of (GAUTIER), A., ii, 646.
- Tin dioxide, crystalline forms of (ARZRUNI), A., ii, 307.
- Orthostannic acid, electrochemical preparation of (LORENZ), A., ii, 647.
- Tin thiophosphide (GRANGER), A., ii, 365.

- Tin sulphide, electrochemical preparation of (LORENZ), A., ii, 648.
 physical change produced by gently heating (SPRING), A., ii, 290.
 Stannic salts, action of nitric peroxide on (THOMAS), A., ii, 365.
 bromide, heat of combination of, with water in the liquid and solid states (PICKERING), A., ii, 148.
 chloride, preparation of (LORENZ), A., ii, 28.
 iodide (THOMAS), A., ii, 608.
 Stannous chloride, velocity of the reaction between ferric chloride and (NOYES and SCOTT), A., ii, 158.
 Tin, detection of arsenic in, when lead is present (DE KONINGH), A., ii, 273.
 estimation of (JANNASCH and LEHNERT), A., ii, 548; (BROOKS), A., ii, 579.
 estimation of, by electrolysis (ENGELS), A., ii, 276.
 estimation of, in alloys with lead, antimony, and arsenic (ANDREWS), A., ii, 501.
 separation of mercury from (JANNASCH and LEHNERT), A., ii, 546.
 Tin-slag, analysis of. (BAILEY), A., ii, 451.
 Tissue, formation of, in plants (CROSS, BEVAN, and SMITH), T., 1605; P., 1896, 174.
 connective mucin from (CHITTENDEN and GIES), A., i, 456.
 Tissues, estimation of urea in (KAUFMANN), A., ii, 130; (SCHÖNDORFF), A., ii, 131.
 Titanium, crystallised (LÉVY), A., ii, 304.
 Titanium alloys of, with aluminium (MOISSAN), A., ii, 602.
 Titanium fluoride (PICCINI), A., ii, 178.
 potassium fluorides (MARCHETTI), A., ii, 20.
 dioxide, separation of ferric oxide from (FRENZEL), A., ii, 112.
 Titanic acid, estimation of, volumetrically in ores (WELLS and MITCHELL), A., ii, 502.
 Titanium silicide (LÉVY), A., ii, 304.
 caesium alum (PICCINI), A., ii, 365.
 Titanium, detection of (PENNINGTON), A., ii, 306.
 estimation of, precautions in (HILLEBRAND), A., ii, 222.
 interference of, in the estimation of phosphorus (PATTINSON and PATTINSON), A., ii, 389.
 Tobacco, estimation of ammonia and nicotine in (KISSLING), A., ii, 401; (VEDRÖDI), A., ii, 630.
 Tobacco. } See Agricultural chemistry (Appendix).
 Tofu. }
 Tolane. See Diphenylacetylene.
 Tolidine, estimation of (VAUBEL), A., ii, 507.
p-Tolilbenzoin, preparation of (MILLER and PLÖCHL), A., i, 609.
 Toluene, discovery of, in coal-tar (HOFMANN LECTURE), T., 693.
 separation of, from coal-tar naphtha (HOFMANN LECTURE), T., 598.
 magnetic rotatory power, &c., of (PERKIN), T., 1064, 1082—1085, 1125, 1191, 1241.
 heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
 Toluene, triamino-, and its salts (PALMER and BRENKE), A., i, 539.
o- and *p*-bromo-, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1131, 1203, 1243.
 2 : 4-bromiodo- (HIRTZ), A., i, 531.
 4 : 2-bromiodo- (HIRTZ), A., i, 531.
 2 : 4 : 6-bromiodonitro- (HIRTZ), A., i, 531.
 bromo-*m*-iododinitro- (m. p. 139—141°) (HIRTZ), A., i, 531.
p-bromo-*o*-nitro- (HANTZSCH and SCHULTZE), A., i, 672.
 dibromotrinitro-, reduction of (PALMER and BRENKE), A., i, 539.
o- and *p*-chloro-, magnetic rotatory power, &c., of (PERKIN), T., 1131, 1203, 1243.
o-, *p*-, *m*-, chloro- (DE CONINCK), A., i, 473.
m-iodo-, product of the action of bromine on (HIRTZ), A., i, 531.
p-iodoxy-, preparation of (WILLGERODT), A., i, 533.
o-nitro-, melting point of (v. SCHNEIDER), A., ii, 290.
o- and *p*-nitro-, magnetic rotatory powers, &c., of (PERKIN), T., 1095, 1131, 1162, 1181, 1239.
exonitro- (HOLLEMAN), A., i, 148.
 preparation of (HANTZSCH and SCHULZE), A., i, 353.
 isomerism of (HANTZSCH and SCHULZE), A., i, 353.
exo-m-dinitro-, and its sodium and potassium derivatives (HOLLEMAN), A., i, 148.
 compound of, with ammonia (HOLLEMAN), A., i, 147.
 1 : 2 : 3-dinitroso- (ZINCKE), A., i, 430.
 1 : 3 : 4-dinitroso- (ZINCKE), A., i, 430.

- o*-Tolueneazo-*o*-cresetol, reduction of (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 25.
- o*-Tolueneazo-*m*-cresetol, reduction of (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Tolueneazo-*o*-cresetol, reduction of (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Tolueneazo-*m*-cresetol, reduction of (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 27.
- p*-Tolueneazo-*o*-cresetol, reduction of (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- p*-Tolueneazo-*m*-cresetol, reduction of, and stilbazonium base of product (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 27.
- o*-Tolueneazo-*m*-cresol (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Tolueneazo-*o*-cresol (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Tolueneazo-*m*-cresol (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 27.
- p*-Tolueneazo-*m*-cresol (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 27.
- o*-Tolueneazophenetoil, reduction of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 24.
- m*-Tolueneazophenetoil, reduction of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- p*-Tolueneazophenetoil, reduction of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- p*-Tolueneazophenol benzyl ether, reduction of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- isobutyl ether, reduction of (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- p*-Toluenediazoamidobenzenesulphonic acid, sodium, disodium, calcium, barium, and toluidine salts (SCHRAUBE and FRITSCH), A., i, 221.
- 1 : 3 : 4-Toluenedicarboxylic acid. See α -Methylphthalic acid.
- p*-Toluenedisulphoxide (MEYER), A., i, 684.
- p*-Toluenesulphinic acid, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- aniline and ammonium salts of (MEYER), A., i, 684.
- p*-Toluenesulphonamide, dichloro- (KASTLE, KEISER, and BRADLEY), A., i, 555.
- o*-Toluenesulphoneglycocine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- p*-Toluenesulphoneglycocine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- o*-Toluic acid, ethylic salts, magnetic rotatory power of (PERKIN), T., 1096, 1097, 1130, 1177, 1238.
- o*-Toluic peroxide (VANINO and THIELE), A., i, 597.
- m*-Toluic acid, tetrachloro- (RUPP), A., i, 618.
- p*-Toluic acid from turnerole (JACKSON and WARREN), A., i, 387.
- ethylic salt, magnetic rotatory power of (PERKIN), T., 1096, 1097, 1130, 1177, 1238.
- tetrachloro- (RUPP), A., i, 618.
- o*-Toluidine, refraction equivalents of, at different temperatures (PERKIN), T., 4; P., 1895, 199.
- magnetic rotatory power of (PERKIN), T., 1104, 1131, 1155, 1159, 1210, 1245.
- amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- estimation of water in (DOBRINER and SCHRANZ), A., ii, 403.
- m*-Toluidine, magnetic rotatory powers, &c., of (PERKIN), T., 1131, 1210, 1245.
- p*-Toluidine, discovery of (HOFMANN LECTURE), T., 646.
- preparation of (HOFMANN LECTURE), T., 597.
- refraction equivalents of, at different temperatures (PERKIN), T., 4; P., 1895, 199.
- magnetic rotatory power of (PERKIN), T., 1131, 1155, 1159, 1209, 1245.
- heat of solution of, in ethylic alcohol, chloroform, and toluene (SPEYER), A., ii, 411.
- action of cyanogen on (HOFMANN LECTURE), T., 590, 649.
- oxidation product of (BARSILOWSKY), A., i, 357.
- colouring matter obtained by oxidation of (HOFMANN LECTURE), T., 605.
- p*-Toluidine amidosulphonate (PAAL and JÄNICKE), A., i, 235.
- p*-Toluidine, estimation of water in (DOBRINER and SCHRANZ), A., ii, 403.
- Toluidines, estimation of, in aniline (DOBRINER and SCHRANZ), A., ii, 402.

- o*-Toluido-*p*-sulphobenzoic acid and its barium salt (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- m*-Toluido-*p*-sulphobenzoic acid and its barium salt (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- p*-Toluido-*p*-sulphobenzoic acid and its barium salt (REMSEN, HARTMAN, and MUCKENFUSS), A., i, 373.
- o*-Toluidotoluquinone (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Toluidotoluquinone (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- p*-Toluido-*p*-tolylaposafranine (FISCHER and HEPP), A., i, 324.
- o*-Tolunitrile, magnetic rotatory powers, &c., of (PERKIN), T., 1096, 1137, 1206, 1244.
- p*-Tolunitrile, preparation of (HOFMANN LECTURE), T., 705.
- magnetic rotatory power of (PERKIN), T., 1096, 1137, 1206, 1244.
- o*-Toluoylalanine, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- p*-Toluoylalanine, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- Toluquinone, *trichloro*- (ELBS and BRUNNSCHWEILER), A., i, 214.
- o*-Toluric acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- m*-Toluric acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- p*-Toluric acid, heat of combustion of (STOHMANN and SCHMIDT), A., ii, 466.
- p*-Tolyl *o*-acetoxystyryl ketone (KOSTANECKI), A., i, 240.
- p*-Tolyl α -coumaryl ketone (KOSTANECKI), A., i, 240.
- p*-Tolyl *o*-hydroxystyryl ketone and its acetyl derivative and dibromide (KOSTANECKI), A., i, 240.
- p*-Tolyl methyl ketone, condensation of, with benzaldehyde (KOSTANECKI and ROSSBACH), A., i, 688.
- p*-Tolyl styryl ketone (KOSTANECKI and ROSSBACH), A., i, 688.
- ψ -Tolylacetic acid, sodium salt of (BUCHNER), A., i, 230.
- tetrabromide (BUCHNER), A., i, 230.
- o*-Tolylallylthiocarbamide, action of bromine on (DIXON), T., 852; P., 1896, 99.
- n*-*o*-Tolylaminopentthiazoline, γ -bromo- (DIXON), T., 28; P., 1895, 216.
- n*-*p*-Tolylaminopentthiazoline, γ -bromo- (DIXON), T., 27; P., 1895, 216.
- p*-Tolylbenzylidene methyl ketone. See *p*-Tolyl styryl ketone.
- Tolylcarbimide, preparation of (HOFMANN LECTURE), T., 715.
- ab*-*o*-Tolylcarboxyethylthiocarbamide (DORAN), T., 327; P., 1896, 74.
- ab*-*p*-Tolylcarboxyethylthiocarbamide (DORAN), T., 328; P., 1896, 74.
- Tolylenediamine, discovery of (HOFMANN LECTURE), T., 688.
- p*-Tolyl-3-ethoxy-*o*-phenylenediamine : its azimide and its stilbazonium base (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- m*-Tolyl-5-ethoxy-*o*-phenylenediamine : its hydrochloride, azimide, stilbazonium base, methenyl derivative, with its nitrate (JACOBSEN, DÜSTERBEHN, KLEIN, and SCHKOLNIK), A., i, 25.
- o*-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine : its hydrochloride, thiocarbonyl compound, and stilbazonium base (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- m*-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine : its azimide and stilbazonium base (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- p*-Tolyl-6-ethoxy-1 : 3 : 4-tolylenediamine : its azimide, thiocarbonyl compound, and stilbazonium base (JACOBSEN, HEBER, HENRICH, and SCHWARZ), A., i, 26.
- o*-Tolylformimido-ethylie ether (WHEELER and BOLTWOOD), A., i, 478.
- p*-Tolylfurfurylidene methyl ketone (KOSTANECKI and PODRAJANSKY), A., i, 689.
- p*-Tolylglyoxylic acid and its ethylic salt (BOUVEAULT), A., i, 616.
- hydrazone of (BOUVEAULT), A., i, 650.
- p*-Tolylhydroxymethylsulphone (MEYER), A., i, 684.
- Tolylie ethereal salts, extraction of (DRAGENDORFF), A., ii, 278.
- o*-Tolylie amylie ether (WELT), A., i, 333.
- mercaptan (VOSWINKEL), A., i, 378.
- methylie ether, magnetic rotatory power of (PERKIN), T., 1127, 1128, 1130, 1159, 1187, 1240.
- m*-Tolylie amylie ether (WELT), A., i, 333.
- methylie ether, magnetic rotatory power of (PERKIN), T., 1127, 1128, 1130, 1159, 1187, 1240.
- p*-Tolylie allylic ether, magnetic rotatory power, &c., of (PERKIN), T., 1141, 1226, 1247.
- amylie ether (WELT), A., i, 333.

- β -Tolylic mercaptan (VOSWINKEL), A., i, 378.
 mesitylic sulphide (BOURGEOIS), A., i, 18.
 methylic ether, magnetic rotatory powers, &c., of (PERKIN), T., 1127, 1128, 1130, 1159, 1187, 1240.
 o-xylylic sulphide (BOURGEOIS), A., i, 18.
 m-xylylic sulphide (BOURGEOIS), A., i, 18.
 p-xylylic sulphide (BOURGEOIS), A., i, 18.
 Tolylketoindene (SCHUYTEN), A., i, 442.
 *di*iodo- (SCHUYTEN), A., i, 442.
 p-Tolylmethylnitramine, o-nitro- (PINNOW), A., i, 161.
 dinitro- (ROMBURGH), A., i, 478.
 p-Tolylmethylnitrosamine, o-nitro- (PINNOW), A., i, 161.
 dinitro- (ROMBURGH), A., i, 478.
 p-Tolyl-o-phenylenediamine (FISCHER), A., i, 628.
 p-Tolylsuccinimide, action of barium hydroxide on (AUWERS and HABGER), A., i, 640.
 velocity of decomposition of, by hydrochloric acid, (MIOLATI), A., ii, 242.
 o-Tolylsulphamic acid, ammonium salt of (PAAL and JÄNICKE), A., i, 235.
 p-Tolylsulphamic acid and its ammonium salt (PAAL and JÄNICKE), A., i, 235.
 3'-o-Tolyltetrahydroquinazoline (BUSCH), A., i, 507.
 3'-p-Tolyltetrahydroquinazoline (BUSCH), A., i, 507.
 o-Tolylthiourea (DIXON), T., 858.
 Topaz from New South Wales (LIVERSIDGE), A., ii, 658.
 synthesis of (REICH), A., ii, 531.
 Tourmaline from Bohemia (KATZER), A., ii, 188.
 Trachea, action of drugs on the secretion of (CALVERT), A., ii, 667.
 Trachyte from East Lothian (HATCH), A., ii, 116.
 tridymite-, from Lyttelton, N.Z. (MARSHALL), A., ii, 193.
 Transition point. See Heat, transition temperature.
 Trehalose, digestion of (BOURQUELOT and GLEY), A., ii, 315.
 Tremolite from Styria (CANAVAL), A., ii, 483.
 Triacetaminoxime (HARRIES), A., i, 318.
 Triacetone-d-glucosheptitol (SPEIER), A., i, 77.
 Triacetotetrazyldiazine (THIELE and INGLE), A., i, 107.
 Triacetoxyhydroxydiphenylacetic acid (HEWITT and POPE), T., 1267; P., 1896, 151.
 Triacetyl-leucodrin (HESSE), A., i, 495.
 Trianilinephosphine hydroxide (MICHAELIS and SILBERSTEIN), A., i, 344.
 oxide (MICHAELIS and SILBERSTEIN), A., i, 344.
 Tri-anisaldehyde, m-nitrotrithio- (WÖRNER), A., i, 227.
 dinitrotrithio- (WÖRNER), A., i, 227.
 Triazoacetic acid, and hydrolysis of (CURTIUS), A., i, 338.
 Triazole compounds (ANDREOCCI), A., i, 221.
 1 : 2 : 3-Triazoledicarboxylic acid (ZINCKE and HELMERT), A., i, 550.
 Tri-benzaldehyde, α -trithio-o-bromo- (WÖRNER), A., i, 226.
 α -trithio-p-bromo- (WÖRNER), A., i, 226.
 β -trithio-o-bromo- (WÖRNER), A., i, 226.
 β -trithio-p-bromo- (WÖRNER), A., i, 227.
 Tribenzenesulphonohydroxylamide, preparation of (PILOTY), A., i, 556.
 Tribenzoyl- β -galactochloral (HARRIOT), A., i, 519.
 Tribenzoylmethane, α - and β -forms of (CLAISEN and FALK), A., i, 559.
 benzoate of, and its anilide (CLAISEN and FALK), A., i, 560.
 p-bromobenzoate of, and its α -naphthoate (CLAISEN and FALK), A., i, 560.
 Tribenzoylmethane, p-bromo- (CLAISEN and FALK), A., i, 559.
 Tribenzoyltrimethylenetriamine (DUDEN and SCHARFF), A., i, 124.
 Tribenzoylvanillin, trithio- (WÖRNER), A., i, 226.
 α -Tribenzyltetrazyldiazine (THIELE and INGLE), A., i, 110.
 β -Tribenzyltetrazyldiazine (THIELE and INGLE), A., i, 110.
 Tricarballylic acid (BISCHOFF), A., i, 468.
 Tricarbonylpiperazine (ROSDALSKY), A., i, 257.
 Trichlorhydrin, action of silver cerotate on (MARIE), A., i, 347.
 Tri-cumaldehyde, m-nitrotrithio- (WÖRNER), A., i, 227.
 α -trithio- (WÖRNER), A., i, 226.
 β -trithio- (WÖRNER), A., i, 226.
 Tri-dimethylgentisic aldehyde, α -trithio- (WÖRNER), A., i, 226.
 β -trithio- (WÖRNER), A., i, 226.
 Tridymite-trachyte from Lyttelton, N.Z. (MARSHALL), A., ii, 193.

- Triethylamine, discovery of (HOFMANN LECTURE), T., 661.
 action of ethylic bromide on (HOFMANN LECTURE), T., 663.
 action of ethylic iodide on (HOFMANN LECTURE), T., 664.
 partial oxidation of (DE HAAS), A., i, 122.
 dibromide, action of zinc ethyl on (LACHMANN), A., i, 460.
- Triethylamylammonium hydroxide, action of heat on (HOFMANN LECTURE), T., 666.
- Triethylearbinol. See Heptylic alcohol.
- Triethylchrysaniline, discovery of (HOFMANN LECTURE), T., 622.
- Triethyldiethylenetriamine, discovery of (HOFMANN LECTURE), T., 687.
- Triethylenediamine (HOFMANN LECTURE), T., 684.
- Triethylenetriamine, discovery of, and its salts (HOFMANN LECTURE), T., 686.
- Triethylmelamine, preparation of (HOFMANN LECTURE), T., 716.
- Triethylphosphine, preparation of (HOFMANN LECTURE), T., 602, 671.
 absorption of oxygen by (JORISSEN), A., i, 589.
 action of carbon tetrachloride on (HOFMANN LECTURE), T., 680.
 action of ethylic chloracetate on (HOFMANN LECTURE), T., 681.
 action of ethylenic dibromide on (HOFMANN LECTURE), T., 678.
 action of iodoform on (HOFMANN LECTURE), T., 680.
 action of sulphur compounds on (HOFMANN LECTURE), T., 674.
 compound of, with carbon bisulphide, and its derivatives (HOFMANN LECTURE), T., 675.
 compound of, with phenylthiocarbimide, and its derivatives (HOFMANN LECTURE), T., 676.
- Triethylphosphine oxide, preparation of (HOFMANN LECTURE), T., 672.
 compound of, with platinum chloride (HOFMANN LECTURE), T., 674.
 compound of, with zinc iodide (HOFMANN LECTURE), T., 674.
 oxychloride, preparation of (HOFMANN LECTURE), T., 674.
 sulphide, preparation of (HOFMANN LECTURE), T., 675.
- Triethylrosaniline, compound of, with ethylic iodide (HOFMANN LECTURE), T., 617.
- Triethyltriethylenetriamine, discovery of (HOFMANN LECTURE), T., 687.
- Triethylvinylphosphonium hydroxide, preparation of (HOFMANN LECTURE), T., 678.
- Trifolium. See Agricultural chemistry (Appendix).
- Tri-gentisic aldehyde, *trithio*- (WÖRNER), A., i, 226.
- Trihydroxybenzophenone. See Alizarin yellow, A.
- Trihydroxybutane, tertiary, nitro- (HENRY), A., i, 4.
- Trihydroxyglutaric acid, anhydride of (BADER), A., i, 336.
- l*-Trihydroxyglutaric acid (FISCHER), A., i, 526.
- Trihydroxylamine, hydriodide of, and the action of heat on (DUNSTAN and GOULDING), T., 840; P., 1896, 73.
- Trihydroxymethane, behaviour of, towards acetic anhydride (GINSBERG), A., i, 447.
- 1 : 2 : 3-Trihydroxyphenylsulphone (HINSBERG and HIMMELSCHNEID), A., i, 685.
- 1 : 3 : 4-Trihydroxyquinoline, 2-chloro-, and its hydrochloride (ZINCKE and WINZHEIMER), A., i, 499.
- 1 : 2' : 2-Trihydroxyquinoline (DIAMANT), A., i, 105.
- Trihydroxyterpane (VON BAEYER and BLAU), A., i, 54.
- Trihydroxyxanthone, dimethyl ether, synthesis of (KOSTANECKI and TAMBOR), A., i, 369.
- 1 : 3 : 4-Triketohydroquinoline, 2-*di*-chloro-, hydrate of, and its hydrochloride (ZINCKE and WINZHEIMER), A., i, 499.
- Trimellitic acid from methylpurpuraxanthin (SCHUNCK and MARCHLEWSKI), T., 70; P., 1895, 203.
- Trimethoxycoumarin (BIGINELLI), A., i, 370.
- Trimethoxycoumarin- β -carboxylic acid and its methylic salt (BIGINELLI), A., i, 370.
- Trimethylacetic acid. See Valeric acids.
- Trimethylacrylic acid. See Hexenoic acids.
- Trimethylallylammonium chloride, action of heat on (HOFMANN LECTURE), T., 670.
- Trimethylisoallylene. See Hexinenes.
- Trimethylallylthiocarbamide dibromide (GADAMER), A., i, 141.
- Trimethylamine, action of halogens on (REMSEN and NORRIS), A., i, 336.
 action of iodine on, in presence of alkali (DELÉPINE), A., i, 589.
 behaviour of, with Nessler's reagent (DELÉPINE), A., i, 589.

- Trimethylamine, partial oxidation of (DE HAAS), A., i, 122.
 salt of, action of iodine and alkali iodide on (DELÉPINE), A., i, 589.
 Trimethylamine dibromide (REMSEN and NORRIS), A., i, 336.
 dichloride (REMSEN and NORRIS), A., i, 336.
 diiodide (REMSEN and NORRIS), A., i, 336.
 hydrochloride and pierate (DELÉPINE), A., i, 589.
 Trimethylapionolic acid (CIAMICIAN and SILBER), A., i, 608.
 Trimethylazoxyaniline (BÖRNSTEIN), A., i, 542.
 2 : 3 : 4-Trimethylbenzaldehyde, preparation of (LUCAS), A., i, 418.
 2 : 3 : 4-Trimethylbenzaldoximes (LUCAS), A., i, 418.
 1 : 2 : 3-Trimethylbenzene. See Hemimellitene.
 1 : 3 : 4-Trimethylbenzene. See ψ -Cumene.
 1 : 2 : 3-Trimethylbenzoic acid. See Prehenitylic acid.
 2 : 4 : 6-Trimethylbenzoic acid. See Mesitylenecarboxylic acid.
 Trimethylbenzoic acids, preparation of (LUCAS), A., i, 418.
 α -s-Trimethylbenzoylpropionic acid (MUHR), A., i, 231.
 Trimethylbromethylammonium bromide, preparation of (HOFMANN LECTURE), T., 680.
 Trimethylisobutylammonium platinochloride, crystalline form of (HOFMANN LECTURE), T., 671.
 Trimethylchrysaniline, discovery of (HOFMANN LECTURE), T., 622.
 Trimethylcyanuric acid (SCHIFF), A., i, 530.
 Trimethyldehydrobrazilin and its acetyl derivative (HERZIG), A., i, 379.
 Trimethylene. See *cyclo*-Propane.
 Trimethylene- β -dinaphthylsulphone (TROEGER and ARTMANN), A., i, 570.
 Trimethylenephenylenediamine (HINSBERG and STRÜPLER), A., i, 48.
 dinitroso- (HINSBERG and STRÜPLER), A., i, 48.
 Trimethylenepiperylum bromide and its salts (GABRIEL and STELZNER), A., i, 703.
 Trimethylenetriamine, tribenzoyl derivative of (DUDEN and SCHARFF), A., i, 124.
 triamino- (DUDEN and SCHARFF), A., i, 123.
 triorthohydroxybenzylidene derivative of (DUDEN and SCHARFF), A., i, 123.
 Trimethylenic glycol (NOYES and WATKINS), A., i, 115.
 1 : 3 : 5 : 2-Trimethylethylbenzene (*ethylmesitylene*), synthesis of (TÖHL), A., i, 17.
 dibromo- (TÖHL), A., i, 17.
 dinitro- (TÖHL), A., i, 17.
 1 : 3 : 5 : 2-Trimethylethylbenzenesulphonic acid, salts of (TÖHL), A., i, 17.
 Trimethylethylene. See Amylene.
 $\alpha\alpha\alpha_1$ -Trimethylglutaranilic acid (AUWERS and ZIEGLER), A., i, 643.
 $\alpha\alpha\alpha_1$ -Trimethylglutaric acid (AUWERS and ZIEGLER), A., i, 643.
 $\alpha\alpha\alpha_1$ -Trimethylglutaric anhydride, bromo- (AUWERS and ZIEGLER), A., i, 643.
 action of bases on (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.
 action of aniline on (AUWERS, SCHIFFER, and SINGHOF), A., i, 643.
 $\alpha\beta\beta$ -Trimethylglutaric acid (PERKIN and THORPE), P., 1896, 156; (AUWERS and ZIEGLER), A., i, 643.
 ethylic salt (PERKIN and THORPE), P., 1896, 156.
 $\alpha\alpha\beta$ -Trimethylglutaric acid, β -bromo-, ethylic salt, and action of alcoholic potassium cyanide on (PERKIN and THORPE), P., 1896, 156.
 Trimethylhæmatoxylin, acetyl derivatives of (HERZIG), A., i, 379.
 2 : 4 : 6-Trimethylhexahydropyridine. See Copellidine.
 1 : 2 : 5-Trimethylcyclohexane (ZELINSKY and REFORMATSKY), A., i, 210.
 nitro-, labile form of (KONOWALOFF), A., i, 676.
 Trimethylcyclohexanone (*trimethylketohexamethylene*) (ZELINSKY and REFORMATSKY), A., i, 130.
 action of nascent hydrogen on (ZELINSKY and REFORMATSKY), A., i, 130.
 Trimethylhydroxylamine, hydriodide of (DUNSTAN and GOULDING), T., 839; P., 1896, 72.
 Trimethyl-3-hydroxytetrahydronaphthylammonium chloride, pierate, aurochloride, and platinochloride (BAMBERGER and LODTER), A., i, 100.
 1' : 3' : 3'-Trimethyl-2'-indolinone and its platinochloride, aurochloride, mercurochloride (BRUNNER), A., i, 625.

- 1' : 3' : 3'-Trimethylindolinum hydroxide and its hydrochloride, sulphate, mercuriochloride, and platinochloride (BRUNNER), A., i, 625.
 dibromo- (BRUNNER), A., i, 625.
 dinitro- (BRUNNER), A., i, 625.
 Trimethyliodethylammonium iodide (GABRIEL and STELTZNER), A., i, 121.
 Trimethylketoexamethylene. See Trimethylcyclohexanone.
 2 : 4 : 6-Trimethylmandelic acid (MEYER and SOHN), A., i, 434.
 2 : 2 : 4-Trimethylpentane-3-ol-1-al. See Hydroxyoctoic aldehydes.
 2 : 2 : 4-Trimethylpentane-1 : 3-diol. See Octyleneglycols.
 2 : 2 : 4-Trimethylpentane-3-ol-ic acid. See Hydroxyoctoic acids.
 Trimethylphosphine, preparation of (HOFMANN LECTURE), T., 671.
 Trimethylpimelic acid, synthesis of (ZELINSKY and REFORMATSKY), A., i, 130.
 diethano-, ethylic salt (ZELINSKY and REFORMATSKY), A., i, 130.
 2 : 2 : 6-Trimethylpiperidine, 4-amino-, and its salts and acetyl derivatives (HARRIES), A., i, 318.
 $\alpha\beta$ -Trimethylpropionic acid. See Hexoic acids.
 Trimethylpropylammonium platinochloride, crystalline form of (HOFMANN LECTURE), T., 671.
 Trimethylisopropylammonium chloride, action of heat on (HOFMANN LECTURE), T., 670.
 Trimethylpyrazine and its salts (BRANDES and STOEHR), A., i, 576.
 2 : 4 : 6-Trimethylpyridine. See Colidine.
 Trimethylpyrogallol, magnetic rotatory power, &c., of (PERKIN), T., 1064, 1127, 1189, 1241.
 Trimethylpyruvic acid (GLÜCKSMANN), A., i, 333.
 1 : 3 : 2'-Trimethylquinoline, condensation of, with opianic acid (NENCKI), A., i, 256.
 Trimethylrosaniline methochloride (HOFMANN LECTURE), T., 625.
 β -Trimethyluric acid (FISCHER and ACH), A., i, 12.
 β -Trinaphthylallyltrisulphone (TROEGER and ARTMANN), A., i, 570.
 Trinitrides, decomposition of (PERATONER and ODDO), A., ii, 245.
 Trioxymethylene, use of, for disinfection (BROCHET), A., i, 345.
 Triphenylearbinol, formation of, from ethylic oxalate and bromobenzene (FREY), A., i, 99.
 2 : 4 : 5-Triphenyl-4 : 5-dihydroglyoxaline (FEIST and ARNSTEIN), A., i, 259.
 2 : 3 : 5-Triphenyl-5 : 6-dihdropyrazine (FEIST and ARNSTEIN), A., i, 258.
 3 : 4 : 6-Triphenyldihdropyridazine (SMITH), A., i, 322.
 Triphenylethanolone. See Diphenylhydroxyacetophenone.
 Triphenylethanone. See Diphenylacetophenone.
 Triphenylguanidine, discovery of (HOFMANN LECTURE), T., 686.
 action of cyanogen on (HOFMANN LECTURE), T., 715.
 Triphenylmelamine, preparation of (HOFMANN LECTURE), T., 716.
 Triphenylmethane, refraction equivalent of (ANDERLINI), A., ii, 229.
 magnetic rotatory power, &c., of (PERKIN), T., 1085, 1086, 1152, 1195, 1230, 1242.
p-nitro-diamino-, reduction of (PRUD'HOMME), A., i, 307.
 Triphenylmethane dyes, constitution of (VAUBEL), A., i, 242.
 Triphenylphosphine and its chloride (HOFMANN LECTURE), T., 683.
 1 : 3 : 4-Triphenylpyrazole (SMITH and RANSOM), A., i, 322.
 3 : 4 : 6-Triphenylpyridazine (SMITH), A., i, 322.
 Triphenylrosaniline, constitution of (HOFMANN LECTURE), T., 614.
 Triphenylrosanilinesulphonic acids, discovery of (HOFMANN LECTURE), T., 616.
 Triphenylstibine: its chloride and hydroxide (HOFMANN LECTURE), T., 683.
 Triphenylvinyllic alcohol, action of hydroxylamine hydrochloride on (BILTZ), A., i, 690.
 Triphosphonium triiodide, preparation of (HOFMANN LECTURE), T., 680.
 Triphylite, optical properties of (PENFIELD and PRATT), A., ii, 184.
 Tripiperonal, α -trithio- (WÖRNER), A., i, 226.
 β -trithio- (WÖRNER), A., i, 226.
 Tripropylamine, partial oxidation of (DE HAAS), A., i, 122.
 Triresoreinol (HESSE), A., i, 153.
 hydrobromide (HESSE), A., i, 153.
 hydrochloride (HESSE), A., i, 152.
 diaethyl derivative of (HESSE), A., i, 153.
 Triresoreinol, bromo-, and its hydrobromide (HESSE), A., i, 153.
 tetrabromo-, and its pentahydrobromide (HESSE), A., i, 153.
 heptabromo- (HESSE), A., i, 153.

- Triticum*. See Agricultural chemistry.
- Tri-*m*-tolualdehyde, α -trithio- (WÖRNER), A., i, 226.
- β -trithio- (WÖRNER), A., i, 226.
- Tri-*p*-tolualdehyde, α -trithio- (WÖRNER), A., i, 226.
- β -trithio- (WÖRNER), A., i, 226.
- Tritoluenesulphonamide (MEYER), A., i, 684.
- Tri-*p*-tolylidibenzylidenetrimethyltriketone (KOSTANECKI and ROSSBACH), A., i, 688.
- Tritolylguanidine: its hydrochloride and nitrate (MARCKWALD), A., i, 30.
- Trivanillin, trithio- (WÖRNER), A., i, 226.
- Tropeine, acetyl, lactyl, succinyl, malyl, tartryl, and hippuryl derivatives of (MERCK), A., i, 65.
- physiological action of derivatives of (MERCK), A., i, 65.
- ψ -Tropeine, benzoyl derivative of, and its salts (WILLSTÄTTER), A., i, 452.
- Tropic acid, scopoline of (MERCK), A., i, 65.
- Tropigenine and its μ -benzoyl derivative (WILLSTÄTTER), A., i, 582.
- ψ -Tropigenine, formation of (WILLSTÄTTER), A., i, 655, 709.
- salts and benzoyl derivative of (WILLSTÄTTER), A., i, 655, 709.
- Tropilene, oxidation of (CIAMICIAN and SILBER), A., i, 397.
- Tropine, constitution of (LADENBURG), A., i, 326.
- and derivatives, formulæ of (WILLSTÄTTER), A., i, 328.
- formation of ψ -tropine from (WILLSTÄTTER), A., i, 451.
- ψ -Tropine, preparation of (WILLSTÄTTER), A., i, 451.
- oxidation of (WILLSTÄTTER), A., i, 451, 709.
- opianate. See Opianic acid, ψ -tropine, salt of.
- Tropinic acid, from dihydroxytropidine (WILLSTÄTTER), A., i, 65.
- constitution of (WILLSTÄTTER), A., i, 267.
- action of phosphorus and hydriodic acid on (CIAMICIAN and SILBER), A., i, 513.
- d*-Tropinic acid and its methylic salt, its methiodide, and other derivatives (WILLSTÄTTER), A., i, 265.
- propylic salt and its methiodide (WILLSTÄTTER), A., i, 267.
- i*-Tropinic acid: its derivatives and salts (WILLSTÄTTER), A., i, 265.
- methylic salt, and its methiodide and other derivatives (WILLSTÄTTER), A., i, 265.
- Tropinone, preparation of, and its salts and methiodide (WILLSTÄTTER), A., i, 327.
- analogy of, with granatonine (WILLSTÄTTER), A., i, 328.
- action of bromine on (WILLSTÄTTER), A., i, 709.
- reduction of (WILLSTÄTTER), A., i, 451.
- cyanhydrin (WILLSTÄTTER), A., i, 582.
- hydrolysis of; formation of isomerides of cocaine (WILLSTÄTTER), A., i, 707.
- Tropinone, *tetrabromo*-, formation, oxidation, and constitution of (WILLSTÄTTER), A., i, 709.
- Tropinonemethylammonium hydroxide, preparation and decomposition of (WILLSTÄTTER), A., i, 327.
- Tropinoneoxime and its derivatives (WILLSTÄTTER), A., i, 327.
- Tropinonephenylhydrazone (WILLSTÄTTER), A., i, 327.
- Tropylscopoline and salts (LUBOLDT), A., i, 396.
- Trypsin, solubility of, in alcohol (DASTRE), A., i, 398.
- Tuberin, a globulin from the potato, preparation and properties of (OSBORNE and CAMPBELL), A., i, 715.
- Tufa, calcareous, from Bungonia, N.S.W. (CURRAN), A., ii, 535.
- Tungsten, preparation of pure (MOISSAN), A., ii, 606.
- atomic weight of (SCHNEIDER), A., ii, 428.
- properties and reactions of (MOISSAN), A., ii, 607.
- Tungsten alloys of, with aluminium (MOISSAN), A., ii, 602.
- with iron (BENNEVILLE), A., ii, 174.
- Tungsten carbide (MOISSAN), A., ii, 607.
- oxyfluoride (PICCINI), A., ii, 178.
- potassium oxyfluorides (MARCHETTI), A., ii, 20.
- Tungstic acid, salts with rare earths (HITCHCOCK), A., ii, 526.
- Metatungstic acid, physical properties of (SOBOLEFF), A., ii, 478.
- Paratungstates of sodium, potassium, and ammonium (HALLOPEAU), A., ii, 652.
- Iodotungstic acids and their salts (CHRÉTIEN), A., ii, 652.
- Phosphododecatungstic acid, physical properties of (SOBOLEFF), A., ii, 477.
- Tungstozirconic. See Zirconotungstic.

- Tungsten: Tungstitartaric acid, salts of (HENDERSON and BARR), T., 1456; P., 1896, 169.
- Turacin, absorption spectrum of (GAMGEE), A., i, 714.
- Turaeoporphyrin, absorption spectrum of (GAMGEE), A., i, 714.
identity of, with hæmatoporphyrin (GAMGEE), A., i, 714.
- Turnerole, properties and formula of (JACKSON and WARREN), A., i, 387.
- Turpethic acid (KROMER), A., i, 386.
- Turpethin from *Ipomœa turpethum* (KROMER), A., i, 386.
the soluble ferment found in dahlia, beetroot, &c. (BERTRAND), A., ii, 571.
- Tyrosin, oxidation of, by a soluble ferment, tyrosinase (BERTRAND), A., ii, 571.
detection of (LANDSTEINER), A., ii, 284.

U.

- Ulex europæus*, occurrence of eytisine in (PLUGGE), A., ii, 61.
- "Ultramarine" from New Mexico (PACKARD), A., ii, 530.
- Umbelliferone from Sagapen resin (HOBENADEL), A., i, 58.
- Undecolic acid. See under Hendecenoic acid.
- iso*-Undeeylamine. See *iso*-Hendecylamine.
- Undeeylenic acid. See Hendecenoic acids.
- Unsaturated compounds, classification of (MICHAEL), A., i, 133.
- Uracyl-2-hydrosulphide, 3-amino-, and its ammonia compound and acetyl derivative (WEIDEL and NIEMIŁOWSKI), A., i, 105.
- m*-Uramidobenzoic acid and its methylic salt (ZINCKE and HELMERT), A., i, 548.
4-amino-, and its salts (ZINCKE and HELMERT), A., i, 548.
4-nitro-, and its salts (ZINCKE and HELMERT), A., i, 548.
- p*-Uramidobenzoic acid and its salts (ZINCKE and HELMERT), A., i, 549.
3-amino-, and its salts (ZINCKE and HELMERT), A., i, 549.
3-nitro-, and its salts (ZINCKE and HELMERT), A., i, 549.
d-nitro-, and its ammonium salt (ZINCKE and HELMERT), A., i, 549.

- 3 : 4-Uramidobenzoyl-1-carboxylic acid. See Diketotetrahydroquinazoline-2-carboxylic acid.
- m*-Uramidodibenzoic acid and its methylic salt (ZINCKE and HELMERT), A., i, 548.
- p*-Uramidodibenzoic acid and its salts (ZINCKE and HELMERT), A., i, 549.
- Uramil, thio- (FISCHER), A., i, 141.
action of hydrochloric and nitric acids on (FISCHER), A., i, 141.
action of potassium cyanate on (FISCHER), A., i, 142.
metallic salts of (FISCHER), A., i, 141.
methyl derivative, action of potassium cyanate on (FISCHER), A., i, 143.
- Uraninite, spectrum of gas from (LOCKYER), A., ii, 596.
- Uranium, preparation and properties of (MOISSAN), A., ii, 525.
temperature of sparks detached by steel from (CHESNEAU), A., ii, 407.
- Uranium alloys of, with aluminium (MOISSAN), A., ii, 602.
- Uranium salts, action of, on organic acids in presence of light (FAY), A., i, 465.
thermochemistry of (ALOY), A., ii, 590.
carbide (MOISSAN), A., ii, 364.
oxynitride (SMITH and MATTHEWS), A., ii, 177.
niobate (LARSSON), A., ii, 564.
dioxide (SMITH and MATTHEWS), A., ii, 177.
potassium sulphate, phosphorescent radiations from (BECQUEREL), A., ii, 406.
- Uranyl cesium chloride (WELLS and BOLTWOOD), A., ii, 108.
molybdate (HITCHCOCK), A., ii, 526.
tungstate (HITCHCOCK), A., ii, 526.
- Urea in animal organs (SCHÖNDORFF), A., ii, 318.
distribution of, between corpuscles and plasma of blood (SCHÖNDORFF), A., ii, 375.
formation of, by ferment action (RICHT), A., ii, 119.
formation of, in the fermentation of uric acid (GÉRARD), A., ii, 668.
products formed in the fermentation of (ADENEY), A., ii, 326.
action of polysulphides on (AUF-SCHLÄGER), A., ii, 574.
- Urea, estimation of, by the hypobromite process (ALLEN), P., 1896, 31.

- Urea, estimation of, in blood and tissues (KAUFMANN), A., ii, 130; (SCHÖNDORFF), A., ii, 131.
- Urea. See also Carbamide.
- Urethane, heat of solution of, in water, methylic, ethylic, and propylic alcohols, chloroform, and toluene (SPEYERS), A., ii, 411.
- decomposition of, with sodium hypochlorite (CONINCK), A., i, 364.
- action of phosphorus trichloride on (LACHMANN), A., i, 601.
- benzoyl derivative of (VON PUCHMANN and VANINO), A., i, 33.
- Urethane, nitro- (THIELE and LACHMANN), A., i, 208.
- nitroso- (THIELE and LACHMANN), A., i, 208.
- Urethaneacetic acid and its ethylic salt (HANTZSCH and METCALF), A., i, 521.
- nitro- (HANTZSCH and METCALF), A., i, 521.
- nitroso-, ethylic salt (HANTZSCH and METCALF), A., i, 521.
- Urethanes (CURTIUS), A., i, 340.
- Uric acid in wing-scales of *Pieridæ* (HOPKINS), A., ii, 198.
- new synthesis of (FISCHER and ACH), A., i, 12.
- solubilities of (SMALE), A., ii, 490.
- action of ammonium sulphide on (FISCHER), A., i, 142.
- fermentation of, by micro-organisms (GÉRARD), A., ii, 668.
- influence of food containing nuclein on the secretion of (UMBER), A., ii, 666.
- nuclein as a source of, in the body (WEINTRAUD), A., ii, 488.
- source of, in urine (CAMERER), A., ii, 379.
- sources of, in urine and fæces (WEINTRAUD), A., ii, 490.
- action and excretion of, in rabbits and dogs (EBSTEIN and NICOLAÏER), A., ii, 379.
- urates, precipitation of, within and without the body (MORDHORST), A., ii, 491.
- Uric acid, separation of, from alloxuric bases (KRÜGER), A., ii, 281.
- estimation of, in urine (KRÜGER), A., ii, 281; (RITTER), A., ii, 343.
- estimation of, by Fehling's solution (RIEGLER), A., ii, 227.
- α -Uric acid, β -thio- (FISCHER), A., i, 142.
- action of fused oxalic acid on (FISCHER), A., i, 142.
- Urine, causes of secretion of (TAMMANN), A., ii, 618.
- Urine, influence of atropine on the secretion of (WALT), A., ii, 666.
- influence of the administration of acids on (DUNLOP), A., ii, 484.
- excretion of calcium salts in the (REY), A., ii, 489.
- excretion of iron in the (TIRMANN), A., ii, 487.
- of the insane, epiguanine a new base found in (KRÜGER), A., i, 62.
- extraction of urobilin from (GARROD and HOPKINS), A., i, 712.
- presence of acetone in (ABRAM), A., ii, 264.
- presence of albumose in, during fever (KREHL and MATTHES), A., ii, 667.
- presence of ammonia in, during fevers (RUMPF; HALLERVORDEN), A., ii, 379.
- presence and amount of ammonia in, during disease (RUMPF), A., ii, 618.
- presence and amount of alloxuric bases in, during nephritis (ZÜLZER), A., ii, 667.
- presence of alloxuric substances in, during disease (BAGINSKY and SOMMERFELD), A., ii, 491.
- presence or absence in, of indican and indoxylglycuronic acid (DAIBER), A., ii, 491.
- presence of lactose, isomaltose, and dextrose in (LEMAIRE), A., ii, 490.
- presence of pentose in (SALKOWSKI), A., ii, 490.
- presence and amount of oxalic acid in (DUNLOP), A., ii, 263.
- absence of sugar in normal (JOHNSON), A., ii, 199.
- precipitation of creatinine from, by lead acetate (COLLS), A., ii, 666.
- proteids of (MÖRNER), A., ii, 120.
- separation of pigments of, by means of phenol (KRAMM), A., ii, 666.
- solubility of uric acid in (SMALE), A., ii, 490.
- sources of acetone in (WEINTRAUD), A., ii, 490.
- sources of hæmatoporphyrin in (STOKVIS), A., ii, 537.
- source of oxalic acid in (DUNLOP), A., ii, 263.
- source of phosphoric acid in (CAMERER), A., ii, 379; (WEINTRAUD), A., ii, 488.
- sources of uric acid in (CAMERER), A., ii, 379; (WEINTRAUD), A., ii, 488, 490; (UMBER), A., ii, 666.
- sources of xanthine bases in (CAMERER), A., ii, 379.
- Urine, detection of albumin in (JELLY), A., ii, 344.

- Urine, detection of creatinine in (DE CONINCK), A., ii, 132.
 detection of mercury in (JOLLES), A., ii, 77.
 detection of pentoses in (TOLLENS), A., ii, 504.
 Ehrlich's diazo-reaction in (HEWLETT), A., ii, 284.
 estimation of acetone in (GEELMUYDEN), A., ii, 679.
 estimation of acidity of (LÉPINOIS), A., ii, 397.
 estimation of chlorides in (DENIGÈS), A., ii, 386.
 estimation of creatinine in (KOLISCH), A., ii, 283.
 estimation of *d*-glucose in (LOHNSTEIN), A., ii, 128.
 estimation of small quantities of glucose in (BUCHNER), A., ii, 225.
 estimation and detection of mercury in (JOLLES), A., ii, 77.
 estimation of urea in, by the hypobromite process (ALLEN), P., 1896, 31.
 estimation of uric acid in (KRÜGER), A., ii, 281; (RITTER), A., ii, 343.
 estimation of xantho-uric derivatives in (DENIGÈS), A., ii, 387.
- Urino-mucoid, separation of, from urine (MÖRNER), A., ii, 120.
- Urobilin, nature and sources of (TOLLES), A., ii, 51.
 chemical and optical properties of (GARROD and HOPKINS), A., i, 713.
 absorption spectrum of (GARROD and HOPKINS), A., i, 713; (GAMGEE), A., i, 714.
 extraction of, from urine (GARROD and HOPKINS), A., i, 712.
- Urtica urens* and *U. dioica*, constituents of (GIUSTINIANI), A., ii, 495.
- Usnic acid in lichens, occurrence of (ZOPF), A., i, 104.

V.

- Vacuum tubes, method of filling, with gases (YOUNG and DARLING), A., ii, 3.
- Valency of gases, connection between the dielectric constant and (LANG), A., ii, 144.
- VALERALDEHYDES:—
iso-Valeraldehyde, action of alcoholic potash on (KOHN), A., i, 461.
 condensation products from (KOHN), A., i, 10.

VALERALDEHYDES:—

iso-Valeraldehyde, condensation of, with β -hydroxy- α -naphthaquinone (HOOKER), T., 1356.

Methylethylacetaldehyde (IPATIEFF), A., i, 402.

Valeranilide (SPIZZICHINO and CONTI), A., i, 432.

Valerian, oil of, hydrolysis of (OLIVIERO), A., i, 492.

Valeriana officinalis (OLIVIERO), A., i, 492.

VALERIC ACIDS:—

Valeric acid, formation of, by the action of light on amylie alcohol (RICHARDSON and FORTEY), T., 1351; P., 1896, 165.

melting and solidifying points of (MASSOL), A., i, 408.

absorption by silk of dilute (WALKER and APPELYARD), T., 1346; P., 1896, 147.

ethylic and amylie salts, molecular volume of, in organic solvents (NICOL), T., 143; P., 1895, 237.

Valeric acid, α -bromo-, ethylic salt, action of alcoholic potash on (PERKIN and GOODWIN), T., 1470.

action of quinoline on (PERKIN and GOODWIN), T., 1470.

iso-Valeric acid (*iso*-propylacetic acid) (HJELT), A., i, 598.

melting and solidifying points of (MASSOL), A., i, 408.

iso-Valeric acid, erotonic salt (CHARON), A., i, 662.

diisobutylacetylenic salt, density of (ANDERLINI), A., i, 203.

iso-Valeric acid, α -bromo-, ethylic salt, action of finely divided silver on (AUWERS and SCHLOSSER), A., i, 639.

Methylethylacetic acid (α -methylbutyric acid; *Hydrotiglic acid*) (FICHTER and HERBRAND), A., i, 463; (CIAMICIAN and SILBER), A., i, 596.

specific rotatory power of (GUYE and ROSSI), A., ii, 85.

separation into optically active components (SCHÜTZ and MARCKWALD), A., i, 203.

salts of, specific rotatory power of solutions of the (GUYE and ROSSI), A., ii, 85.

Methylethylacetic acid, γ -bromo- (BENTLEY, HAWORTH, and PERKIN), T., 174.

ethylic salt (BENTLEY, HAWORTH, and PERKIN), T., 174; P., 1896, 36.

VALERIC ACIDS:—

Methylethylacetic acid, γ -bromo-, ethylic salt, action of ethylic sodiumisopropylmalonate on (BENTLEY, HAWORTH, and PERKIN), T., 162.

γ -chloro-, anilide of (BENTLEY, HAWORTH, and PERKIN), T., 175; P., 1896, 37.

Trimethylacetic acid, methylamides, action of nitric acid on (FRANCHIMONT), A., i, 602.

iso-Valeric anhydride, refraction equivalent of (ANDERLINI), A., ii, 229.

VALERIC CHLORIDE:—

Methylethylacetic chloride, γ -chloro- (BENTLEY, HAWORTH, and PERKIN), T., 175; P., 1896, 37.

iso-Valeroin. See Butyl α -hydroxyamyl ketone.

VALEROLACTONES:—

Valerolactone (SPENZER), A., i, 128.

α -Methylbutyrolactone (BENTLEY, HAWORTH, and PERKIN), T., 173; P., 1896, 36.

and the action of hydriodic acid on (FICHTER and HERBRAND), A., i, 463.

action of hydrobromic acid on (BENTLEY, HAWORTH, and PERKIN), T., 174; P., 1896, 36.

action of phosphorus pentachloride on (BENTLEY, HAWORTH, and PERKIN), T., 174; P., 1896, 37.

γ -Valerolactone, refraction equivalent of (ANDERLINI), A., ii, 229.

Valeronitrile, preparation of (HOFMANN LECTURE), T., 696.

iso-Valerophenone-*o*-carboxylic acid (BROMBERG), A., i, 580.

iso-Valeroylmalic acid, rotatory power of the methylic, ethylic, propylic, and isobutylic salts of (WALDEN), A., ii, 136.

Valeroylmandelic acid, rotatory power of the ethylic salt of (WALDEN), A., ii, 138.

iso-Valerylideneacetoacetic acid, ethylic salt of (KNOEVENAGEL), A., i, 210.

iso-Valerylidenebisacetonedicarboxylic acid, ethylic salt of (KNOEVENAGEL), A., i, 212.

iso-Valerylphenylsemicarbazide (WIDMAN), A., i, 630.

Valve, convenient form of Bunsen (KREIDER), A., ii, 161.

Vanadiferous coal from Peru (TORRICO Y MECA), A., ii, 252.

Vanadium, preparation of (MOISSAN), A., ii, 608.

Vanadium-alloys with iron, copper, and aluminium (MOISSAN), A., ii, 609.

Vanadium carbide (MOISSAN), A., ii, 608.

ammonium alum (PICCINI), A., ii, 304.

cæsium alum (PICCINI), A., ii, 305.

rubidium alum (PICCINI), A., ii, 305.

Vanillic acid, synthesis of (FAJANS), A., i, 369.

Vanillin, synthesis of (FAJANS), A., i, 368.

Vanillinaetic acid (GASSMANN), A., i, 425.

Vaso-motor nerves, action of, on metabolism (TANGL), A., ii, 43.

Vapour density. See Density.

Vapour pressure. See Heat.

Vapour pressure of hydrated salts. See Heat, dissociation pressure.

Vegetable matter, dead, decomposition of (BREAL), A., ii, 670.

Velocity of a reversible reaction of the first order (KÜSTER), A., ii, 158.

Velocity of change of alkyl ammonium cyanates into the corresponding carbanides (WALKER and APPLEYARD), T., 193; P., 1896, 12.

of *syn*- into *anti*-aldoximes (LEY), A., ii, 243.

of anissynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

of benzsynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

of *p*-bromobenzsynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

of *p*-chlorobenzsynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

of diazoamide into amidoazo-compounds (GOLDSCHMIDT and REINDERS), A., ii, 515, 556.

of *p*-iodobenzsynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

of thiophensynaldoxime acetate into the nitrile and acetic acid (LEY), A., ii, 243.

produced by enzymes (TAMMANN), A., ii, 244.

Velocity of decomposition of acids containing sulphur and nitrogen (WAGNER), A., ii, 470.

of allylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.

of benzylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.

of ethylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.

of glutarimide by hydrochloric acid (MIOLATI), A., ii, 242.

- Velocity of decomposition of methylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.
 of phenylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.
 of potassium hypiodite (NOYES and SCOTT), A., ii, 158.
 of propylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.
 of pyrotartarimide by hydrochloric acid (MIOLATI), A., ii, 242.
 of succinimide by hydrochloric acid (MIOLATI), A., ii, 242.
 of *p*-tolylsuccinimide by hydrochloric acid (MIOLATI), A., ii, 242.
- Velocity of etherification, acceleration of the, by hydrochloric acid (TAFEL), A., ii, 470.
 of chloracetic acids (LICHTY), A., ii, 557.
 in presence of acids (GOLDSCHMIDT), A., ii, 638; (PETERSEN), A., ii, 638.
- Velocity of hydrolysis of methylic and ethylic acetates in alcoholic solution (GENNARI), A., ii, 413.
 of salicin by acids (NOYES and HALL), A., ii, 159.
 of sugar and ethereal salts by acids under pressure (ROTHMUND), A., ii, 594.
- Velocity of inversion of sugar by salts (LONG), A., ii, 414.
- Velocity of lactone formation in acids of the sugar group (HJELT), A., i, 596.
- Velocity of oxidation of hydriodic acid, mathematical theory of the (WARDER), A., ii, 297.
- Velocity of reaction in gases (STORCH), A., ii, 296; (COHEN), A., ii, 593.
 of ethylic iodide and silver nitrate dissolved in methylic and in ethylic alcohols (CHIMINELLO), A., ii, 354.
 between ferric and stannous chlorides (NOYES and SCOTT), A., ii, 158.
 between hydriodic and bromic acids (NOYES and SCOTT), A., ii, 158.
 of hydrogen peroxide and hydriodic acid (NOYES and SCOTT), A., ii, 158; (HARCOURT and ESSON), A., ii, 238.
 of potassium iodide and chlorate in acid solution (SCHLUNDT), A., ii, 297.
- Veratraldehyde, preparation of (BOUVEAULT), A., i, 649.
 hydrazone (BOUVEAULT), A., i, 650.
- Veratranilide (BRÜGGEMANN), A., i, 356.
- Veratric acid. See Dimethylprotocatechuic acid.
- Veratrine, action of, on the embryonic heart (PICKERING), A., ii, 46.
- Veratrole, benzoyl derivative of, and its phenylhydrazone (BRÜGGEMANN), A., i, 356.
 bromo- (MOUREU), A., i, 426.
 tetrabromo- (BRÜGGEMANN), A., i, 356.
 tetrachloro- (BRÜGGEMANN), A., i, 356.
 diiodo- (BRÜGGEMANN), A., i, 356.
 dinitro- (BRÜGGEMANN), A., i, 356.
 thioanilide (BRÜGGEMANN), A., i, 356.
- Veratronitrile (MOUREU), A., i, 426.
- Veratroylcarboxylic acid, and its ethylic salt (BOUVEAULT), A., i, 616.
- Veratroylglyoxylic acid hydrazone (BOUVEAULT), A., i, 650.
- Veratrylamine and its platinochloride, and benzoyl derivative (MOUREU), A., i, 426.
- Vermiculite from Styria (CANAVAL), A., ii, 483.
- Vernix caseosa*, composition of (RUPPEL), A., ii, 199.
- Vesuvian. See Idocrase.
- Vetch, proteids of the (OSBORNE and CAMPBELL), A., i, 715.
- Vetches. See Agricultural Chemistry (Appendix).
- Vibrio Metschnikovii*, inversion of cane-sugar by (FERMI and MONTESANO), A., ii, 493.
- Vicia faba*, germination of (PRIANISCHNIKOFF), A., ii, 380.
 optimum temperature for respiration of (ZIEGENBEIN), A., ii, 265.
sativa, nitrogenous constituents of (SCHULZE), A., ii, 208.
- Vicin is a glucoside not an alkaloid (RITTHAUSEN), A., i, 696.
- Vine, red dye of leaves of (WEIGERT), A., i, 388.
- Vinegar, estimation of chlorides in (DENIGÈS), A., ii, 386.
- Vinylamine, preparation of (GABRIEL and STELZNER), A., i, 121.
 action of boiling water on (GABRIEL and STELZNER), A., i, 121.
 action of carbon bisulphide on (GABRIEL and STELZNER), A., i, 121.
 oxalate (GABRIEL and STELZNER), A., i, 121.
- Vinyldiacetonaminoxime (HARRIES), A., i, 318.
- Vinyl bromide (BENTLEY, HAWORTH, and PERKIN), T., 165; (HAWORTH and PERKIN), T., 175.
- Vinylpicolinic acid, β -dichloroxy-, lactone of (ZINCKE and WINZHEIMER), A., i, 500.

- Vinylcyclopropane and its oxidation (GUSTAVSON), A., i, 669.
 $\alpha\beta$ -dibromo-(exo) (GUSTAVSON), A., i, 669.
- Vinylcyclopropane glycol (GUSTAVSON), A., i, 669.
- Vinylpyridinecarboxylic acid, dichloro- (ZINCKE and WIEDERHOLD), A., i, 502.
 trichloro- (ZINCKE and WIEDERHOLD), A., i, 502.
- Vinyltrimethylene. See Vinylcyclopropane.
- Violaniline, discovery of (HOFMANN LECTURE), T., 610.
- Violuric acid, electrolytic dissociation and colour of (DONNAN), A., ii, 405.
- Viscosity of aqueous solutions of sodium sulphate (D'ARCY), T., 999; P., 1896, 104.
 of argon and helium (RAYLEIGH), A., ii, 599.
 of solutions of the salts of the polythionic acids (HERTLEIN), A., ii, 353.
- Vitellin, non-occurrence of, in the almond (OSBORNE and CAMPBELL), A., i, 716.
- Vitis pentaphylla*, occurrence of galactan in (YOSHIMURA), A., ii, 60.
vinifera, constituents of sap of (HÉBERT), A., ii, 495.
 and *labrusca*, formation of proteids and carbohydrates in (SAPOSCHNIKOFF), A., ii, 537.
- Volemitol, preparation and properties of (BOURQUELOT), A., i, 273.
 action of anhydrous sodium acetate and acetic anhydride on (BOURQUELOT), A., i, 273.
 acetal compounds of (BOURQUELOT), A., i, 273.
- Volgerite from Broken Hill, N.S.W. (SMITH), A., ii, 30.
- Voltameter, iodine-, for small currents (HERROUN), A., ii, 7.
- Volume changes during the formation of dilute solutions (JONES), P., 1895, 179.
- Volume, critical. See Critical volume.
- Volume of ethylic alcohol vapour, connection between temperature, pressure and (BATELLI), A., ii, 150.
- Volume of solids, simple apparatus for measuring the (GUGLIELMO), A., ii, 244.
- Volume of solutions, adiabatic changes of the (ROGÓYSKI and TAMMANN), A., ii, 513.
 influence of pressure on the (TAMMANN), A., ii, 13.
- Volume of sulphates of potassium, rubidium, and caesium in combination with other sulphates (TUTTON), T., 497; P., 1896, 71.
- Volumes, molecular and atomic solution (TRAUBE), A., ii, 152.
- Volumes, molecular, determination of molecular weight by means of (TRAUBE), A., ii, 411.
 in dilute solutions (KOHLRAUSCH), A., ii, 89.
 of gases, L. Meyer's investigations on (BEDSON), T., 1423; P., 1896, 119.
 of solids and liquids, extension of the laws of Avagadro and Gay Lussac to the (TRAUBE), A., ii, 235.
 of the double sulphates of potassium, rubidium, and caesium (TUTTON), T., 457; P., 1896, 68.
 of the salts of the polythionic acids (HERTLEIN), A., ii, 353.
 of organic compounds (TRAUBE), A., ii, 354.
 of hydrocarbons (TRAUBE), A., ii, 153.
 of ethylic and amylie benzoates in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic butyrate in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic and amylie formates in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic malonate in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic oxalate in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic salicylate in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic succinate in organic solvents (NICOL), T., 143; P., 1895, 237.
 of ethylic and amylie valerates in organic solvents (NICOL), T., 143; P., 1895, 237.
 of methylic, butylic, and amylie acetates in organic solvents (NICOL), T., 143; P., 1895, 237.
- Volumes, molecular solution, determination of molecular weights by means of (TRAUBE), A., ii, 153.
 of organic compounds (TRAUBE), A., ii, 354.
- Vortex atoms (FITZGERALD), T., 889; P., 1896, 25.

W.

- Wallflower, yellow, colouring matters of the (PERKIN and HUMMEL), T., 1566; P., 1896, 185.
- Walnut, proteids of the (OSBORNE and CAMPEELL), A., i, 716.
- Water, constitution of (BRÜHL), A., ii, 163.
 composition of, by volume (THOMSEN), A., ii, 471.
 vapour, apparatus for demonstrating the volumetric composition of (FREER), A., ii, 558.
 rate of formation of, from electrolytic gas (COHEN), A., ii, 593.
 electrolysis of (SOKOLOFF), A., ii, 510.
 influence of temperature on the magnetic rotatory power of (PERKIN), T., 1060; P., 1896, 122.
 electrolytic dissociation of, in the pure state and mixed with alcohol (LÖWENHERZ), A., ii, 587.
 specific heat of, at different temperatures (DIETERICI), A., ii, 232.
 heat of evaporation of (BECKMANN, FUCHS, and GERNHARDT), A., ii, 237.
 influence of, on the combination of carbonic oxide and oxygen (DIXON), T., 776; P., 1896, 55.
 of crystallisation in organic salts (SALZER), A., ii, 415.
 and saline solutions (BRAUNS), A., ii, 111.
- Water of infiltration, losses of nitrogen in (SCHLÖESING), A., ii, 69.
- Water, mineral, argon in gases from (KELLAS and RAMSAY), A., ii, 655.
 occurrence of argon and helium in (KAYSER), A., ii, 19; (BOUCHARD), A., ii, 117.
 fluorine in (CASARES), A., ii, 42.
 variation in composition of, at different periods (FRESENIUS), A., ii, 435.
 enclosed in gypsum from Sicily (SJÖGREN), A., ii, 110.
 from Albano, gases of (NASINI and ANDERLINI), A., ii, 366.
 from Austria (JOHN and EICHELTER), A., ii, 252.
 from Bavaria (SCHWAGER and GÜMBEL), A., ii, 431.
 from Bungonia, N.S.W. (CURRAN), A., ii, 534.
 from Canada (HOFMANN), A., ii, 191, 259.
 bituminous, containing ammonia, from Clarmont (PARMENTIER), A., ii, 195.
- Water, mineral, hot springs of Ædipos and Gialtra, Greece (DAMBERGIS), A., ii, 535.
 from Galicia, Spain (CASARES), A., ii, 42.
 from Ischl, Upper Austria (DIETRICH), A., ii, 435.
 from Landeck, L. Meyer's investigation of (BEDSON), T., 1413.
 from Lake Corangamite, Victoria (CRAIG and WILSMORE), A., ii, 194.
 from Liebwerd, Bohemia (HIBSCH), A., ii, 534.
 of the Knaresborough dropping well (BURRELL), T., 536; P., 1896, 73.
 from Nashville, Illinois (STEIGER), A., ii, 194.
 from Nassau (FRESENIUS), A., ii, 435.
 from the Victoria spring, Nassau (FRESENIUS), A., ii, 315.
 from Óvári, Hungary (NEUMANN), A., ii, 615.
 from near Rome (FELICIANI), A., ii, 615.
 from the Soap Lake, Washington (STEIGER), A., ii, 194.
 from Styria (REIBENSCHUN), A., ii, 435.
 from Taos, New Mexico (HILLEBRAND), A., ii, 194.
 from the Transvaal (COHEN), A., ii, 436.
 sulphuretted, argon and helium in (TROOST and OUVARD; BOUCHARD), A., ii, 298.
 natural, occurrence of argon and helium in (KAYSER), A., ii, 19; (MOUREU; TROOST and OUVARD; BOUCHARD), A., ii, 298.
 colouring matter of, source, composition, and estimation of (RICHARDS and ELLMS), A., ii, 340.
 and polluted, fermentation changes in (ADENEY), A., ii, 323.
 occurrence of iodine in (LECCO), A., ii, 579.
 from Persia, examination of (NATTERER), A., ii, 68.
 rain, chlorine in (PASSERINI), A., ii, 69.
 of the Kansas River and its tributaries (BAILEY and FRANKLIN), A., ii, 615.
 of the Seine, quantity of nitrates in (SCHLÖESING), A., ii, 496.
 of the Pacific (CHABRIÉ), A., ii, 117.
 potable, nitrates in (SCHLÖESING), A., ii, 541.

Water, apparatus for estimating the absorbent power of the soil for (BEESON), A., ii, 496.
 examination of, microscopically (DIBDIN), A., ii, 341.
 detection of lead and copper in (EGELING), A., ii, 549.
 estimation of, in silicates (JANNASCH and WEINGARTEN), A., ii, 272.
 estimation of, in superphosphates (DE KONINGH), A., ii, 541.
 estimation of the colour of (HAZEN), A., ii, 548.
 estimation of carbonic anhydride in (MEILLÈRE), A., ii, 391.
 estimation of small quantities of lead in (ANTONY and BENELLI), A., ii, 549.
 estimation of nitrites in (GILL and RICHARDSON), A., ii, 340.
 estimation of dissolved oxygen in (ROMIJN), A., ii, 579.
 Water-gas, explosive mixtures of air and (CLOWES), P., 1895, 201.
 Wax :—
 Beeswax, cerotic and melissic acids from (MARIE), A., i, 347.
 estimation of wax substitute in (BUCHNER), A., ii, 486.
 Weighings, reduction of, to a vacuum (SALOMON), A., ii, 640.
 Weld, luteolin, the colouring matter of (PERKIN), T., 206; P., 1896, 37.
 Wernerite. See Scapolite.
 Whale-meal, feeding experiments with (SEBELIEN), A., ii, 197.
 Whale oil, analysis of (SCHWEITZER and LUNGWITZ), A., ii, 399.
 Wheat, effect of chemical substances on the germination of seeds of (SIGMUND), A., ii, 441.
 Wheat. See also Agricultural Chemistry (Appendix).
 Wheat-meal, proteids from (KJELDAHL), A., i, 583.
 Wild marsh rosemary, oil from (HJELT), A., i, 248.
 Willyamite from Broken Hill, N.S.W. (PITTMAN), A., ii, 31.
 Wiluite. See Idocrase.
 Wine, cause of the bouquet of (MÜLLER), A., ii, 201.
 effect of alum in (SESTINI), A., ii, 342.
 sweet, relative proportions of glucose, &c., in (KÖNIG), A., ii, 79.
 rhubarb, amount of acid in (OTTO), A., ii, 539.
 cultivation of pure wine yeast and its use in the manufacture of (MÜLLER), A., ii, 201.
 mannitol fermentation in Sicilian (BASILE), A., ii, 121.

Wine, detection of boric acid in (VILLIERS and FAYOLLE), A., ii, 75.
 detection of foreign colouring matters in (BELAR), A., ii, 630.
 detection of fluorine in (NIVIÈRE and HUBERT), A., ii, 497.
 estimation of volatile acids in (JAY), A., ii, 397.
 estimation of alcohol and total solids in, by an optical method (RIEGLER), A., ii, 224.
 estimation of alum in (GEORGES), A., ii, 451.
 estimation of chlorides in (DENIGÈS), A., ii, 386.
 estimation of glycerol in (LABORDE), A., ii, 77; (PARTHEIL), A., ii, 78.
 estimation of tannin in (MANCEAU), A., ii, 282.
 estimation of tartar and tartaric acid in (HAAS), A., ii, 583.
 Witherite from Przibram (HOFMANN), A., ii, 610.
 Wollastonite in slags (HEBERDEY), A., ii, 371.
 Wood, products of the distillation of (BARILLOT), A., i, 462.
 Wood-pulp, detection of, in paper (WOLESKY), A., ii, 505.
 Wool-fat, composition of (DARMSTAEDTER and LIFSCHÜTZ), A., i, 346, 522.
 hydrolysis of (DARMSTAEDTER and LIFSCHÜTZ), A., i, 198.
 analysis of (ULZER and SEIDEL), A., ii, 628.
 Woollen fibre, action of alcoholic hydrogen chloride and sodium nitrite on (CURTIUS), A., i, 337.
 Wort. See Beer wort.
 Wurtzite from Mies, Bohemia (BECKE), A., ii, 108.

X.

X rays. See Light.
 Xanthine in young plants of *Vicia sativa* (SCHULZE), A., ii, 208.
 bromo-, action of potash on (FISCHER), A., i, 13.
 Heteroxanthine, constitution of (KRÜGER and SALOMON), A., i, 191, 200.
 physiological action of (KRÜGER and SALOMON), A., ii, 200.
 Xanthine-bases, sources of, in fæces (WEINTRAUD), A., ii, 490.
 sources of, in urine (CAMERER), A., ii, 379.
 Xanthone, preparation of (JEITELES), A., i, 435.

- Xanthone, action of acetic acid and zinc dust on (GURGENJANZ and KOSTANECKI), A., i, 52.
- Xanthone group of yellow colouring matters (PERKIN), T., 1440; P., 1896, 167.
- Xantho-uric derivatives, estimation of, in urine (DENIGÈS), A., ii, 387.
- Xenotime from North Carolina (EAKINS), A., ii, 39.
- from Norway (ERDMANN), A., ii, 570.
- Xenylamine. See Diphenyl, *p*-amino-.
- Xiphonite from Etna (PLATANIA), A., ii, 259.
- Xylan (*wood gum*), action of acetic chloride on (BADER), A., i, 335.
- acetyl and benzoyl derivatives of (BADER), A., i, 335.
- nitrates (BADER), A., i, 335.
- o*-Xylene, magnetic rotatory powers, &c., of (PERKIN), T., 1130, 1159, 1192, 1193, 1229, 1241.
- compound obtained by the action of ozone on (RENARD), A., i, 147.
- m*-Xylene, magnetic rotatory powers, &c., of (PERKIN), T., 1130, 1159, 1192, 1193, 1229, 1241.
- heat of evaporation of (MARSHALL and RAMSAY), A., ii, 349.
- m*-Xylene, 4 : 5-dichloro- (KLAGES), A., i, 291.
- 4-chloro-5-nitro- (KLAGES), A., i, 291.
- 4-chloro-2 : 5-dinitro- (KLAGES), A., i, 291.
- 5-chloro-2 : 4 : 6-trinitro- (KLAGES), A., i, 291.
- 4 : 5-dinitroso- (ZINCKE), A., i, 430.
- p*-Xylene, magnetic rotatory power, &c., of (PERKIN), T., 1130, 1159, 1192, 1193, 1229, 1241.
- tetrachloro- (RUPP), A., i, 618.
- m*-Xyleneazophenetoil, reduction of (JACOBSEN and SCHKOLNIK), A., i, 27.
- m*-Xyleneazophenol (JACOBSEN and SCHKOLNIK), A., i, 27.
- 1 : 3 : 4-Xylenesulphonealanine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- m*-Xylene-2-sulphonamide, 5-chloro- (KLAGES), A., i, 291.
- 1 : 3 : 4-Xylenesulphoneglycocine, electrolytic conductivity of solutions of (LOVÉN), A., ii, 413.
- m*-Xylene-2-sulphonic acid, 5-chloro- (KLAGES), A., i, 291.
- m*-Xylene-2-sulphonic chloride, 5-chloro- (KLAGES), A., i, 291.
- 1 : 3 : 4-Xylenol, tribromo-, mono- and di-bromide (AUWERS and CAMPENHAUSEN), A., i, 424.
- Xylic acid (2 : 4-dimethylbenzoic acid) (BOUVEAULT), A., i, 649.
- p*-Xylic acid (3 : 4-dimethylbenzoic acid), reduction of (BENTLEY and PERKIN), P., 1896, 79.
- 1 : 3 : 4-Xylidine, behaviour of, towards acetaldehyde (MILLER and PLÖCHL), A., i, 534.
- colouring matter obtained by oxidation of (HOFMANN LECTURE), T., 605.
- 2 : 5-dinitro-, and its acetyl derivative (KLAGES), A., i, 291.
- 5-iodo-, and its salts and acetyl derivative, and nitrile from (KERSCHBAUM), A., i, 162.
- 1 : 3 : 5-Xylidine, 4-chloro-, and its benzoyl derivative (KLAGES), A., i, 291.
- dichloro-, and its benzoyl derivative (KLAGES), A., i, 291.
- Xylidine-red, discovery of (HOFMANN LECTURE), T., 620.
- Xyloic acid (FISCHER and BROMBERG), A., i, 348.
- m*-Xyloquinone, 4-chloro- (KLAGES), A., i, 291.
- Xylose from cocoa-nut shells (DE HAAS and TOLLENS), A., ii, 64.
- existence of formal derivatives of, in cereal celluloses (CROSS, BEVAN, and SMITH), T., 804; P., 1896, 96.
- identification of, in soluble products of the acid hydrolysis of cellulose (CROSS, BEVAN, and SMITH), T., 811; P., 1896, 96.
- action of acetic anhydride on (BADER), A., i, 336.
- action of alcoholic ammonia on (DE BRUYN and VAN LEENT), A., i, 119.
- action of dilute alkalis on (DE BRUYN), A., i, 116.
- action of nitric acid on (BADER), A., i, 336, 405.
- Xylose- α -allylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Xylosecamine (DE BRUYN and VAN LEENT), A., i, 119.
- Xylose- α -amylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Xylose- α -benzylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Xylosebenzylmercaptal (LAWRENCE), A., i, 272.
- Xylose-ethylenemercaptal (LAWRENCE), A., i, 272.
- Xylose- α -ethylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Xylosenaphthylhydrazone (VAN EKENSTEIN and DE BRUYN), A., i, 588.
- Xylosetrimethylenemercaptal (LAWRENCE), A., i, 272.

Xylosotrihydroxyglutaric acid, inactive and *lævo*- (FISCHER and HERBORN), A., i, 587, 588.

anhydride (BADER), A., i, 405.

Xyloylpropionic acids. See Dimethylbenzoylpropionic acids.

p-Xylyl ketone, preparation of (COMSTOCK), A., i, 613.

m-Xylylacetic acid from *i*-campholenic acid (GUERBET and BÉHAL), A., i, 652.

Xylylcarbimide, preparation of (HOFMANN LECTURE), T., 715.

ab-m-Xylylcarboxyethylthiocarbamide (DORAN), T., 329; P., 1896, 74.

m-Xylylcarboxylic acid, preparation of (BOUVEAULT), A., i, 616.

m-Xylylene-2 : 5-diamine, 4-chloro-, and its benzoyl derivative (KLAGES), A., i, 291.

p-Xylylencexodiamine, salts of, and its acetyl and benzoyl derivatives (LUSTIG), A., i, 163.

nitro-, salts of (LUSTIG), A., i, 164.

p-Xylylencexodiphtalamic acid (LUSTIG), A., i, 163.

p-Xylylencexodiphtalimide (LUSTIG), A., i, 163.

nitro- (LUSTIG), A., i, 163.

m-Xylylgyoxylic acid and its ethylic salt (BOUVEAULT), A., i, 616.

Y.

Yeast, cultivation of pure wine, and its use in the manufacture of wines (MÜLLER), A., ii, 201.

enzymes present in (BAU), A., i, 453.

fermentation of furfuroids by (CROSS, BEVAN, and SMITH), T., 816; P., 1896, 96.

influence of oxygen and hydrogen on fermentation by (RAPP), A., ii, 668.

cholesterol from (GÉRARD), A., i, 21.

sugar formed in the autodigestion of (SALKOWSKI), A., ii, 202.

Yeast, apiculated, fermentation by (RIETSCH and HEISELIN), A., ii, 53.

Yeast, elliptical, fermentation by (RIETSCH and HEISELIN), A., ii, 53.

Yeast, white and rose, inversion of cane sugar by (FERMI and MONTESANO), A., ii, 493.

Yeasts and fungi found on different grapes (MÜLLER), A., ii, 201.

fermentation of cane sugar with different (HIEPE), A., ii, 320.

reducing power of various pure (NASTUKOFF), A., ii, 202.

Yogoite from Montana (WEED and PIRSSON), A., ii, 192.

Ytter spar. See Xenotime.

Yttrium and thorium minerals in Norway (SCHMELCK), A., ii, 186.

Yttrium carbide (PETTERSSON), A., ii, 25; (MOISSAN and ÉTARD), A., ii, 423.

niobates (LARSSON), A., ii, 564.

oxide, new source of (PHIPSON), A., ii, 422.

colloidal solution of (DELAFONTAINE), A., ii, 562.

sulphate, electrolytic conductivity of aqueous solutions of (JONES), A., ii, 462.

Yttrium, separation of thorium from (FRESENIUS and HINTZ), A., ii, 677.

Z.

Zeolites, dehydration of, and substitution of ammonia for water in, &c. (FRIEDEL), A., ii, 481.

Zeorin, occurrence of, in different lichens (ZOPF), A., i, 104.

Zeorinin, preparation and properties of (ZOPF), A., i, 104.

Zinc, atomic weight of (RICHARDS and ROGERS), A., ii, 21.

presence of carbon and sulphur in (FUNK), A., ii, 247.

action of, on a photographic plate (COLSON), A., ii, 601.

boiling point of (LE CHATELIER), A., ii, 87.

vapour density of (BILZ), A., ii, 152.

rate of diffusion of, in mercury (HUMPHREYS), T., 251; P., 1896, 9.

reduction of solutions of salts by (KIPPENBERGER), A., ii, 522.

Zinc alloys with cadmium, solution, and diffusion of, in mercury (HUMPHREYS), T., 1681; P., 1896, 220.

with copper, structure and constitution of (CHARPY), A., ii, 421.

mechanical properties of (CHARPY), A., ii, 170.

solution and diffusion of, in mercury (HUMPHREYS), T., 1682; P., 1896, 220.

with silver, melting points of (GAUTIER), A., ii, 646.

Zinc salts, physiological action of (ATHANASIU and LANGLOIS), A., ii, 319.

bromide, thermochemical data of the compound of mercuric cyanide with (VARET), A., ii, 88.

hydrated basic carbonate of, from Spain (CESÀRO), A., ii, 479.

- Zinc chloride, fused, electrolysis of (LORENZ), A., ii, 22.
 potential difference required to electrolyse fused (LORENZ), A., ii, 586.
 oxychloride (PERROT), A., ii, 561.
 chromate and dichromate (SCHULZE), A., ii, 25.
 hydroxide, electrochemical preparation of (LORENZ), A., ii, 647.
 oxyiodides (TASSILLY), A., ii, 362.
 niobate (LARSSON), A., ii, 564.
 thiophosphite (FERRAND), A., ii, 418.
 thiopyrophosphate (FERRAND), A., ii, 473.
 sulphate, purification of (KNOBLOCH), A., ii, 562.
 energy and electromotive force required to electrolyse (JAHN), A., ii, 230, 231.
 thermal expansion of solutions of (DE LANNOY), A., ii, 233.
 dissociation pressure of hydrated (MULLER-ERZBACH), A., ii, 295.
 solubility of isomorphous mixtures of magnesium sulphate and (STORTENBEKER), A., ii, 14.
 caesium sulphate, density and optical behaviour of (TUTTON), T., 383.
 magnesium alum from New South Wales (CARD), A., ii, 252.
 potassium sulphate, density and optical behaviour of (TUTTON), T., 374.
 rubidium sulphate, density and optical behaviour of (TUTTON), T., 379.
 sulphide, physical change produced by gently heating (SPRING), A., ii, 290.
 effect of high temperature on amorphous (MOURLOT), A., ii, 603.
- Zinc cyanide, technical estimation of (BETTEL), A., ii, 224.
 ethobromide (LACHMANN), A., i, 460.
 methyl, preparation of, from zinc and methylic iodide (IPATIEFF), A., i, 402.
- Zinc, estimation of, electrolytically (NICHOLSON and AVERY), A., ii, 627.
 estimation of, volumetrically (STONE), A., ii, 126; (LESCOEUR and LEMAIRE), A., ii, 501.
- Zinc, estimation of, volumetrically in its ores (DE KONINCK and PROST), A., ii, 675.
 estimation of, volumetrically by alkalis (RUOSS), A., ii, 500.
 estimation of, volumetrically by potassium ferrocyanide (DE KONINCK and PROST), A., ii, 675.
 estimation of, in dried apples (LEGLER), A., ii, 450.
 estimation of, in organic salts (VON RITTER), A., ii, 578.
 estimation of carbon and sulphur in (FUNK), A., ii, 274.
 separation of, qualitatively from iron, nickel, cobalt, chromium, manganese, and aluminium (HARE), A., ii, 127.
 separation of copper from (MAWROW and MUTHMANN), A., ii, 338.
 separation of manganese and copper from (JANNASCH), A., ii, 546.
 separation of manganese from (JANNASCH and VON CLOEDT), A., ii, 220.
 separation of nickel from (JANNASCH), A., ii, 546.
 separation electrolytically from gold and silver (SMITH and WALLACE), A., ii, 220.
- "Zinkmanganerz" from Carinthia (BRUNLECHNER), A., ii, 256.
- Zinnwaldite, constitution of (CLARKE), A., ii, 38.
- Zirconium carbide (MOISSAN and LENGFIELD), A., ii, 428.
 oxychloride (VENABLE), A., ii, 478.
 caesium fluorides (WELLS and FOOTE), A., ii, 179.
 niobate (LARSSON), A., ii, 564.
 oxide, new source of (PHIPSON), A., ii, 422.
 dioxide, action of phosphorus pentachloride on (SMITH and HARRIS), A., ii, 179.
 Zirconic acid, calcium and lithium salts of (VENABLE and CLARKE), A., ii, 653.
- Zirconium sulphite (VENABLE and BASKERVILLE), A., ii, 527.
- Zoisite from Styria (LOVREKOVIĆ), A., ii, 433.
 from Switzerland and the Tyrol (WEINSCHENK), A., ii, 569.

APPENDIX.

Agricultural Chemistry.

ANIMAL PRODUCTS AND FEEDING EXPERIMENTS.

- Brushwood as a food for animals (RAMM), A., ii, 45.
- Buckwheat grain as a food for sheep (WICKE and WEISKE), A., ii, 198.
- Butter, effect of temperature on the refractive power of (BECKURTS and HEILER), A., ii, 81.
- melting point of, from different animals (PIZZI), A., ii, 120.
- Butter, analysis of, by the refractometer and polarising microscope (BESANA), A., ii, 129.
- examination of, by the borax process (LEVIN), A., ii, 454.
- estimation of butyric acid in (WILCOX), P., 1895, 202.
- estimation of volatile and insoluble acids in (BEAL), A., ii, 129.
- Cattle, feeding experiments on (RAMM), A., ii, 45; (SEBELEIN), A., ii, 197; (MALPEAUX), A., ii, 662.
- poisoning of, by potassium nitrate and by corn stalks (MAYO), A., ii, 264.
- Cellulose, feeding experiments with, on sheep (LEHMANN), A., ii, 262.
- Cheese, action of alcoholic hydrogen chloride and sodium nitrite on (CURTIUS), A., i, 337.
- experiments on the digestibility of (STUTZER), A., ii, 683.
- Cheese, examination of (STUTZER), A., ii, 683.
- extraction of fat from (HENZOLD), A., ii, 680.
- estimation of albumose and peptone in (STUTZER), A., ii, 684.
- margarine, &c., analysis of (KÜHN), A., ii, 82.
- Fat, feeding experiments with, on sheep (LEHMANN), A., ii, 262.
- Feeding cakes, estimation of essential oil of mustard in (PASSON), A., ii, 678.
- Feeding experiments with pumpkin seed and buckwheat grain (WICKE and WEISKE), A., ii, 198.
- Feeding of cattle with whale and herring meal (SEBELIEN), A., ii, 197.
- Feeding, influence of variations in, on composition of meat (WOODS and PHELPS), A., ii, 44.
- Fibre, crude, digestion and food value of (HOLDEFLEISS), A., ii, 616.
- Food, or foods, effects of different, on the production of fat and flesh (LEHMANN), A., ii, 262.
- in relation to brittleness of bones in cattle (KELLNER, KÖHLER, and BARNSTEIN), A., ii, 46.
- brushwood as a, for animals (RAMM), A., ii, 45.
- fat and starch as (WICKE and WEISKE), A., ii, 535.
- crude fibre as a (HOLDEFLEISS), A., ii, 616.
- pentosans as (WEISKE), A., ii, 375.
- pumpkin seed and buckwheat grain as (WICKE and WEISKE), A., ii, 198.
- sugar as a, for cattle (MALPEAUX), A., ii, 662.
- whale and herring meal as a (SEBELIEN), A., ii, 197.
- Forage, brushwood as a substitute for (RAMM), A., ii, 45.
- Hay, digestion and food value of (HOLDEFLEISS), A., ii, 616.
- Herring meal, feeding experiments with (SEBELIEN), A., ii, 197.
- Milk. See main Index.
- Poison, potassium nitrate as a, in cattle (MAYO), A., ii, 264.
- corn-stalks as, in cattle (MAYO), A., ii, 264.
- Pumpkin seed cake as a food for sheep (WICKE and WEISKE), A., ii, 198.
- Sheep, feeding experiments on (WOODS and PHELPS), A., ii, 44; (WICKE and WEISKE), A., ii, 198; (LEHMANN), A., ii, 268.
- Starch, feeding experiments with, on sheep (LEHMANN), A., ii, 262.
- Sterilisation of milk (CAZENEUVE), A., ii, 120.
- Sugar as a food (STOKVIS, MOSO, and HARLEY), A., ii, 44.
- as a food for cattle (MALPEAUX), A., ii, 662.

MANURES.

- Alumina, influence of, in reversion of superphosphate (SMETHAM), A., ii, 364.
- Bone meal as a manure (MÄRCKER), A., ii, 270.
- phosphates, effect of, on different soils (ULBRICHT), A., ii, 68.
- Carnallite, effect of, on yield and composition of grass (MÄRCKER), A., ii, 271.
- Dung, horse-, influence of, on nitrification (PAGNOUL and DEHÉRAIN), A., ii, 329.
- Guano, Peruvian, estimation of nitrogen in (HEIBER), A., ii, 217.
- Lime, effect of different amounts of magnesia and of, on plants (LOEW and HONDA), A., ii, 446.
- action of, on nodule bacteria (TACKE), A., ii, 439.
- Quicklime, use of, as a manure for cultivation of *Leguminosæ* (SALFELD), A., ii, 332.
- Magnesium, effect of salts of, as manure (LARBALÉTRIER and MALPEAUX), A., ii, 446.
- Magnesia, effect of different amounts of lime and of, on plants (LOEW and HONDA), A., ii, 446.
- Manure, use of quicklime as a, for cultivation of *Leguminosæ* (SALFELD), A., ii, 332.
- pigeon (SCHULZE), A., ii, 215.
- stable, decomposition of nitrogen compounds in (JENTYS), A., ii, 619.
- Manures, availability of nitrogen in various (JOHNSON and JENKINS), A., ii, 620.
- action of different, in formation of sugar in beetroot (SCHNEIDEWIND and MÜLLER), A., ii, 539.
- effect of different, on oats and turnips (SCHREIBER), A., ii, 66.
- effect of different, on plants (MÄRCKER), A., ii, 270.
- effect of different, on rye (REMY), A., ii, 670.
- effect of, on the composition and combustibility of tobacco (PATTERSON), A., ii, 211.
- effect of potash, on different soils (WOOD), T., 288; P., 1896, 13.
- increase of crop by potash, compared with available potash in soil (WOOD), T., 289; P., 1896, 13.
- cause of loss of nitrogen in (BURRI, HERFELDT, and STUTZER), A., ii, 572.
- Manures, experiments to avoid loss of nitrogen in (BURRI, HERFELDT, and STUTZER), A., ii, 445.
- phosphate (VON LIEBENBERG), A., ii, 214.
- selection of, for particular soils (PASERINI), A., ii, 330.
- Manures, artificial, analysis of (GRUEBER), A., ii, 74.
- estimation of nitrogen, new distillation tube for (HOPKINS), A., ii, 543.
- estimation of nitrogen in, in presence of nitrates (SHERMAN), A., ii, 125.
- Peruvian guano, estimation of nitrogen in (HEIBER), A., ii, 217.
- estimation of phosphoric acid in (VEITCH), A., ii, 543.
- estimation of phosphoric acid in, gravimetrically (MEILLÈRE), A., ii, 389.
- estimation of phosphoric acid in, volumetrically (LINDEMANN and MOTTEU), A., ii, 388.
- estimation of phosphoric acid in, by the citrate method (RUNYAN and WILEY), A., ii, 126; (BERGAMI), A., ii, 273.
- estimation of citrate-soluble phosphoric acid in (REITMAIR), A., ii, 575.
- estimation of insoluble phosphoric acid in (BRYANT), A., ii, 623.
- estimation of insoluble phosphoric acid in, volumetrically (EDWARDS), A., ii, 273.
- estimation of potash in, as potassium platinochloride (WINTON), A., ii, 126.
- estimation of sodium and potassium in (CAMERON), A., ii, 392.
- Manurial value of basic slag as determined by citrate solubility (WAGNER), A., ii, 68.
- Nitrogen, assimilation of, by plants (STOKLASA), A., ii, 204; (ÆBY), A., ii, 381.
- assimilation of organic, by plants (PAGNOUL), A., ii, 67.
- assimilation of, in plants from nitrates and ammonia (KINOSHITA), A., ii, 55.
- assimilation of, by rye (REMY), A., ii, 670.
- effect of abundant application of, on the assimilation and respiration of plants (MÜLLER), A., ii, 54.

Nitrogen, availability of, in various fertilisers (JOHNSON and JENKINS), A., ii, 620.
 cause of loss of, in manure (BURRI, HERFELDT, and STUTZER), A., ii, 572.
 experiments to avoid loss of, in manure (BURRI, HERFELDT, and STUTZER), A., ii, 445.
 decomposition of, compounds in manure (JENTYS), A., ii, 619.
 value of, in various manures as compared with sodium nitrate (MÄRCKER), A., ii, 270.

Nitrates, action of vegetable acids on insoluble phosphates in presence of (LOGES), A., ii, 621.
 effect of, on growth of plants (PITSCH and VAN HAARST), A., ii, 212.
 as manure for rye (REMY), A., ii, 670.

Phosphorus in various forms as a manure (MÄRCKER), A., ii, 270.
 application of, to soils as phosphates and superphosphates (PAGEOT), A., ii, 269.

Phosphoric acid required for cultivated plants (SMETS and SCHREIBER), A., ii, 68.
 result of application of, in different forms to oats and turnips (SCHREIBER), A., ii, 66.
 of basic slag, citrate solubility of the (HOFFMEISTER), A., ii, 214.

Phosphates, insoluble, action of vegetable acids on, in presence of nitrates (LOGES), A., ii, 621.
 assimilation of, by rye (REMY), A., ii, 670.
 application of crude, to soil (PAGEOT), A., ii, 269.
 bone, effect of, on different soils (ULBRECHT), A., ii, 68.

Phosphates, use of, to prevent loss of nitrogen as ammonia in manures (BURRI, HERFELDT, and STUTZER), A., ii, 445.
 manuring, experiments on (VON LIEBENBERG), A., ii, 214.

Superphosphates, application of, to soil (PAGEOT), A., ii, 269.
 effect of oxide of iron and alumina on the reversion of (SMETHAM), A., ii, 364.
 estimation of water in (DE KONINGH), A., ii, 541.

Slag, basic, action of vegetable acids on, in presence of nitrates (LOGES), A., ii, 621.
 application of, to soil (PAGEOT), A., ii, 269.
 as a manure (MÄRCKER), A., ii, 270.
 citrate solubility of the phosphoric acid of (HOFFMEISTER), A., ii, 214.
 citrate solubility of, as expressing its manurial value (WAGNER), A., ii, 68.

Pigeon manure (SCHULZE), A., ii, 215.

Potassium, absorption of, by plants (LECHARTIER), A., ii, 331.
 as plant food, importance of (VON FEILITZEN), A., ii, 269.
 assimilation of, by rye (REMY), A., ii, 670.
 required for cultivated plants (SMETS and SCHREIBER), A., ii, 68.
 salts, effect of, on the growth of beetroot (MÄRCKER), A., ii, 270.
 manure, increase of crop by, compared with available potash in soil (WOOD), T., 289; P., 1896, 13.

Sodium nitrate as a manure for beetroot (MÄRCKER), A., ii, 270.

PLANTS.

Germination, chemical changes during (REY-PAILHADE), A., ii, 326.
 changes during, of barley (EHRICH), A., ii, 541.
 effect of chemical substances on (SIGMUND), A., ii, 441.
 effect of certain substances as manures on (CLAUDEL and CROCHETELLE), A., ii, 442.
 effect of phosphoric acid and phosphates on (CLAUDEL and CROCHETELLE), A., ii, 442.
 fermentation during (GRÜSS), A., ii, 669.

Germination of plants (PRIANISCHNIKOFF), A., ii, 380.
 of seeds, effect of alkaloids on (Mosso), A., ii, 326.

Nitrogen, fixation of, in *Leguminosæ* (STOKLASA), A., ii, 205.
 relation of symbiosis and the assimilation of (STOKLASA), A., ii, 204.
 as nitrates in plants (SCHULZE), A., ii, 494.
 acids, injury to plants by (KÖNIG and HASELHOFF), A., ii, 210.

Nitrates, effect of, on algæ (WYPLEL), A., ii, 267.

Plant food, importance of potash as (VON FEILITZEN), A., ii, 269.

Plants, assimilation of nitrogen by (STOKLASA), A., ii, 204; (AEBY), A., ii, 381.

assimilation of organic nitrogen by (PAGNOUL), A., ii, 67.

assimilation of nitrogen in, from nitrates and ammonia (KINOSHITA), A., ii, 55.

assimilation of the nutritive matters of the soil by (KÖNIG and HASELHOFF), A., ii, 213.

effect of different amounts of lime and magnesia on (LOEW and HONDA), A., ii, 446.

effect of magnesium salts as manure on (LARBALÉTRIER and MALPEAUX), A., ii, 446.

effect of different manures on (MÄRCKER), A., ii, 270.

effect of various manures on growth of certain (DEHÉRAIN), A., ii, 331.

effect of different mineral manures on, with reference to nodule bacteria (TACKE), A., ii, 439.

germination of (PRIANISCHNIKOFF), A., ii, 380.

effect of chemical substances on germination of (SIGMUND), A., ii, 441.

effect of abundant application of nitrogen on the assimilation and respiration of (MÜLLER), A., ii, 54.

effect of nitrates on the growth of (PITSCH and VAN HAARST), A., ii, 212.

nitrogen as nitrates in (SCHULZE), A., ii, 494.

nitrogen as nitrates in seedlings of (SCHULZE), A., ii, 494.

injury to, by nitrogen acids (KÖNIG and HASELHOFF), A., ii, 210.

nutrition of, by inorganic substances (BENECKE), A., ii, 572.

nutrition of, influence of light on the consumption of asparagine in (KINOSHITA), A., ii, 54.

nutrition of, influence of methylic alcohol in the (KINOSHITA), A., ii, 54.

nutrition of, influence of calcium phosphate and phosphorus on the (STOKLASA), A., ii, 266.

phosphate manuring of (VON LIEBENBERG), A., ii, 214.

requirements for potash and phosphoric acid of (SMETS and SCHRIEBER), A., ii, 384.

minimum absorption of potassium by (LECHARTIER), A., ii, 331.

Plants, detection of proteosomes in (LOEW), A., ii, 58.

identification and isolation of acids in (LINDET), A., ii, 539.

occurrence of albumin in spring and autumn in (DAIKUHARA), A., ii, 55.

occurrence of boric acid in (JAY), A., ii, 327.

occurrence of glutamine in (SCHULZE), A., ii, 572.

occurrence of maltase in (BOURQUELOT), A., i, 111.

pectase in (BERTRAND and MALLEVRE), A., ii, 267.

formation of amides in (TREUB), A., ii, 328.

formation of asparagine in, supplied with nitrates and ammonia (KINOSHITA), A., ii, 54.

formation of pentoses in (GOETZE and PFEIFFER), A., ii, 443.

formation of proteids and carbohydrates in (SAPOSCHNIKOFF), A., ii, 537.

formation of proteids from asparagine in (KINOSHITA), A., ii, 54.

formation of proteids in, and the part played by asparagine in their nutrition (LOEW), A., ii, 56.

formation from different organic compounds of proteids in chlorophyllous (LOEW), A., ii, 57.

formation of tissue material in (CROSS, BEVAN, and SMITH), T., 1605; P., 1896, 174.

proteids from wheat meal and other meals (KJELDAHL), A., i, 583.

amount of substance soluble in water in (GAIN), A., ii, 268.

See further Plants in main Index.

Plants, individual:—

Barley plant, analysis of (CROSS, BEVAN, and SMITH), A., ii, 122.

assimilation of nitrogen from nitrates and ammonia in (KINOSHITA), A., ii, 55.

assimilation of the nutritive matters of the soil by (KÖNIG and HASELHOFF), A., ii, 213.

changes in, during germination (EHRICH), A., ii, 541.

effect of magnesium salts and iron sulphate as manure on (LARBALÉTRIER and MALPEAUX), A., ii, 446.

effect of various manures on growth of (DEHÉRAIN), A., ii, 331.

effect of weather on permanent fibre in (CROSS, BEVAN, and SMITH), A., ii, 122.

Plants, individual:—

Barley, yield of, from different soils (WOOD), T., 288; P., 1896, 13.

straw, carbohydrates of (CROSS, BEVAN, and SMITH), T., 1604; P., 1896, 174.

Beans, assimilation of nitrogen by (BILLWILLER), A., ii, 440.

assimilation of the nutritive matters of the soil by (KÖNIG and HASELHOFF), A., ii, 213.

Beet (*Beta vulgaris*), potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

accumulation of sugar in the root of the (MAQUENNE), A., ii, 328.

nutrition and formation of substance in sugar, in second year of growth (STROHMER, BRIEM, and STIFT), A., ii, 538.

Beetroot, action of different manures in formation of sugar in (SCHNEIDEWIND and MÜLLER), A., ii, 539.

effect of potassium salts and potassium sodium nitrates on the growth of (MÄRCKER), A., ii, 270.

estimation of organic and inorganic acidity simultaneously in (SIDERSKY), A., ii, 397.

Cannabis sativa, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

Cereals, assimilation of nitrogen by (REMY), A., ii, 670.

Clover, effect of potash manure on (VON FEILITZEN), A., ii, 269.

Faba vulgaris, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

Fagopyrum esculentum, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

Grain, effect of magnesium salts and iron sulphate as manure on (LARBALÉTRIER and MALPEAUX), A., ii, 446.

Graminaceæ, assimilation of the nutritive matter of the soil by (KÖNIG and HASELHOFF), A., ii, 213.

Grass, effect of kainite and carnallite on the yield and composition of (MÄRCKER), A., ii, 271.

Haricots, effect of copper oxide on the nutrition of (TSCHIRCH), A., ii, 329.

Hops, composition of (BEHRENS), A., ii, 207.

Plants, individual:—

Indigoferæ, formation of indigo in plants of the (VAN LOOKEREN and VAN DER VEEN), A., ii, 207.

Leguminosæ, assimilation of the nutritive matters of the soil by (KÖNIG and HASELHOFF), A., ii, 213.

fixation of nitrogen in (STOKLASA), A., ii, 205.

use of quicklime as a manure for cultivation of (SALFELD), A., ii, 332.

Lupinus angustifolia, assimilation of nitrogen by (STOKLASA), A., ii, 204.

luteus, assimilation of nitrogen by (STOKLASA), A., ii, 204.

Lupinus, black Siberian, amount of alkaloids in (SCHULZE), A., ii, 211.

Maize, assimilation of nitrogen from nitrates and ammonia in (KINOSHITA), A., ii, 55.

potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

Melons, composition of different (BERSCH), A., ii, 384.

Moulds, assimilation of nitrogen by (PURIEWITSCH), A., ii, 571.

effect of different organic compounds in the nutrition of (LOEW), A., ii, 56.

Mustard, assimilation of nitrogen by (AEBY), A., ii, 381.

Oats, assimilation of phosphorus by (STOKLASA), A., ii, 266.

effect of potash manure on (VON FEILITZEN), A., ii, 269.

identification of various kinds of (BALLAND), A., ii, 65.

Papilionaceæ, nitrogen assimilation by (BILLWILLER), A., ii, 440.

Pea, proteids of the (OSBORNE and CAMPBELL), A., i, 715.

nitrogen assimilation of (AEBY), A., ii, 381; (BILLWILLER), A., ii, 440.

effect of potash manure on (VON FEILITZEN), A., ii, 269.

effect of chemical substances on the germination of seeds of (SIGMUND), A., ii, 441.

Potatoes, effect of magnesium salts and iron sulphate as manure on (LARBALÉTRIER and MALPEAUX), A., ii, 446.

Rye, effect of climate on the assimilation by (REMY), A., ii, 670.

effect of various manures on (REMY), A., ii, 670.

effect of potash manure on (VON FEILITZEN), A., ii, 269.

Plants, individual :—

- Secale, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Soja beans, preparation of tofu and koridofu from (INOUE), A., ii, 65.
- Sulla, growth of, and its percentage composition (GRANDEAU), A., ii, 268.
- Tobacco, combustibility of (CSERHÁTI), A., ii, 444.
- effect of manures on the composition and combustibility of (PATTERSON), A., ii, 211.
- Triticum*, mineral nutrition of (BENECKE), A., ii, 572.
- spelta*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Trifolium incarnatum*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.

Plants, individual :—

- Trifolium pratense*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- repens*, potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Vetches, nitrogen assimilation of (BILLWILLER), A., ii, 440.
- Vicia sativa*, nitrogenous constituents of (SCHULZE), A., ii, 208.
- potash and phosphoric acid required by (SMETS and SCHREIBER), A., ii, 384.
- Vine, effect of copper salts on the growth of the (BERLESE and SOSTEGNI), A., ii, 267.
- Wheat, effect of various manures on growth of (DEHÉRAIN), A., ii, 331.
- Tofu, preparation and composition of (INOUE), A., ii, 65.

SOILS.

- Calcium carbonate, estimation of, in soil (MAUZELIUS and VESTERBERG), A., ii, 219.
- Calcium oxide (*lime*), estimation of, in soil (BASILE and DE CELLIS), A., ii, 126.
- estimation of, rapidly in soils (NANTIER), A., ii, 545.
- Fertility of soils, effect of cultivation on (SNYDER), A., ii, 214.
- Hippuric acid, behaviour of, in soils (YOSHIMURA), A., ii, 67.
- Nitrification, conditions of (GODLEWSKI), A., ii, 669.
- effect of carbon bisulphide on (PAGNOUL), A., ii, 67.
- influence of horsedung and carbon bisulphide on (PAGNOUL and DEHÉRAIN), A., ii, 329.
- during decomposition of vegetable matters (BRÉAL), A., ii, 670.
- in regard to polluted water (ADENEY), A., ii, 325.
- of various manures (MÄRCKER), A., ii, 270.
- rate of, in different soils (MARCILLE), A., ii, 669.
- Nitrifying organisms, action of, on dead vegetable matter (BRÉAL), A., ii, 670.
- Nitrates, reduction of, in arable soil (BRÉAL), A., ii, 444.
- Nitrogen, transformations of, in the soil (PAGNOUL and DEHÉRAIN), A., ii, 329.

- Nitrogen, losses of, in waters of infiltration (SCHLÆSING), A., ii, 69.
- Phosphoric acid, soluble, of the soil, action of lime and magnesia on (SCHREIBER), A., ii, 66.
- Phosphates, action of, on solubility of the potassium of the soil (PASSERINI), A., ii, 330.
- Potassium of the soil, action of salts on the solubility of (PASSERINI), A., ii, 330.
- Sodium chloride and nitrate, action of, on the solubility of the potassium of the soil (PASSERINI), A., ii, 330.
- Soil, or soils, analysis of different (WOOD), T., 289; P., 1896, 13.
- analysis of, by plants (LECHARTIER), A., ii, 331.
- assimilation of the nutritive matters of the, by plants (KÖNIG and HASELHOFF), A., ii, 213.
- effect of bone phosphates on different (ULBRICHT), A., ii, 68.
- effect of copper salts on the (BERLESE and SOSTEGNI), A., ii, 267.
- behaviour of hippuric acid and salts in (YOSHIMURA), A., ii, 67.
- action of lime and magnesia on the soluble phosphoric acid of the (SCHREIBER), A., ii, 66.
- action of salts on the solubility of the potassium of (PASSERINI), A., ii, 330.

Soil, effect of addition of, to dead vegetable matters (BRÉAL), A., ii, 670.

nitrogen assimilation and bacteria of the (STOKLASA), A., ii, 207.

rate of nitrification in different (MARCILLE), A., ii, 669.

reduction of nitrates in arable (BRÉAL), A., ii, 444.

Soils, acid, application of phosphates and superphosphates to (PAGEOT), A., ii, 269.

American, composition of native and cultivated (SNYDER), A., ii, 214.

exhausted, effect of carbon bisulphide on (OBERLIN), A., ii, 67.

fertile, influence of sulphur in forming (GRANDEAU), A., ii, 269.

Soils, Persian, examination of (NATTERER), A., ii, 68.

Soil, apparatus for estimating the water absorbed by the (BEESON), A., ii, 496.

estimation of calcium and magnesium carbonates in (MAUZELIUS and VESTERBERG), A., ii, 219.

estimation of lime in (BASILE and DE CELLIS), A., ii, 126.

estimation of lime in, rapidly (NANTIER), A., ii, 545.

estimation of phosphoric acid in (WILLIAMS), A., ii, 334; (KILGORE), A., ii, 335; (GLADDING), A., ii, 336.

estimation of available potash and phosphoric acid in (WOOD), T., 287; P., 1896, 13.

ERRATA.

VOL. LXII (ABSTR., 1892).

Page	Line	
420	18	for "Brandite" read "Brandtite."
585	4	„ "cyanide" read "oxide."

VOL. LXIV (ABSTR., 1893).

PART I.

124	top	„ "Acid" read "Action."
280	2	„ " $C_6H_4 < \underset{N}{\overset{C(COOH)}{\text{---}}} > N$ " read " $C_6H_4 < \underset{N}{\overset{C(COOH)}{\text{---}}} > NH$."
610	8	„ "1892" read "1891."

VOL. LXIV (ABSTR., 1893).

PART II.

285	2*	„ "C" read "Cu."
382	2	„ "Sundite" read "Sundtite."
„	11	„ " $(Ag_2Cu_2Fe)S, Sb_2S_3$ " read " $(Ag_2Cu_2Fe)S, Sb_2S_3$."

VOL. LXVI (ABSTR., 1894).

INDEX.

519	4, col. ii.	for "animal" read "vegetable."
-----	-------------	--------------------------------

VOL. LXVIII (ABSTR., 1895).

PART II.

Page	Line	
172 ✓	17	for "K. KOSMAN" read "HANS BERNHARD KOSMANN."
222 ✓	16*	" "silver iodide" read "silver sulphide."
505 ✓	2	" "tetartohedral" read "tetrahedral."

INDEX.

573 ✓ 15, col. i, for "499" read "449."

VOL. LXX (ABSTR., 1896).

PART I.

16 ✓	25	for "211.5—212.5°" read "189.5—190°."
" ✓	28	" "189.5—190°" " "211.5—212.5°."
26 ✓	10, 11	" "orthotolueneorthocresetoil" read "orthotolueneazoorthocresetoil."
27 ✓	9,* 8*	" "metaphenetoilparaphenetoil" " "metaphenetoilazoparaphenetoil."
43 ✓	4,* 3*	" "2:3-diethoxybenzoylformic" " "2:4-diethoxybenzoylformic."
52 ✓	12, 13	" "2:7:2':7'-tetramethylxanthylene" read "2:7:2':7'-tetramethyldixanthylene."
—89 ✓	74	" "NO ₂ .CH(COOH) ₂ " read "NO ₂ .CH(CONH ₂) ₂ ."
147 ✓	10*	" "574" read "653."
" ✓	4*	" "C ₆ H ₃ (NO ₃) ₃ " read "C ₆ H ₃ (NO ₂) ₃ ."
235 ✓	16*	" "methylphenylhydrazinesulphonate" read "phenylmethylhydrazinesulphamate."
343 ✓	18*	" "thiosulphochloride" read "thiochloride."
401 ✓	5*	" "CMe ₂ .CBr.CHMeBr" " "CMe ₂ Br.CHMeBr."
425 ✓	11*	" "one ethylic union" read "one ethylenic union."
434 ✓	13* & 10*	" "Trimethylphenylacetic acid" read "Trimethylphenylglycollic acid."
436 ✓	6	" "Benzylidenemethylhydrazine" " "Phenylbenzylidenemethylhydrazine."
478 ✓	16*	" "NPh.CH.NH.C ₆ H ₃ Cl ₂ " read "NPh.CH.NH.C ₆ H ₃ Cl ₂ ."
531 ✓	14*	" "2:4:2-bromidonitrotoluene" read "2:4:6-bromidonitrotoluene."
547 ✓	23	" "Hemellitene" read "Hemimellitene."
548 ✓	5	" "NH ₂ :NH.NHCONH ₂ :COOH" read "NH ₂ :NH.CONH ₂ :COOH."
673 ✓	14*	" "CHMe ₂ .CH ₂ .CH ₂ .CH(NO ₂).[CH ₂] ₃ .CHMe ₂ " read "CHMe ₂ .CH ₂ .CH(NO ₂).[CH ₂] ₃ .CHMe ₂ ."
686 ✓	17	delete "C ₁₃ H ₁₆ N ₂ S ₂ O ₄ ."

Page Line

- 693 15-29 The constitution assigned to the two naphthylenediaminedisulphonic acids should be reversed, the authors having described the 1 : 3' . . . 3 : 1'-acid as 1 : 3' . . . 4 : 1', and *vice versa*.

VOL. LXX (ABSTR., 1896).

PART II.

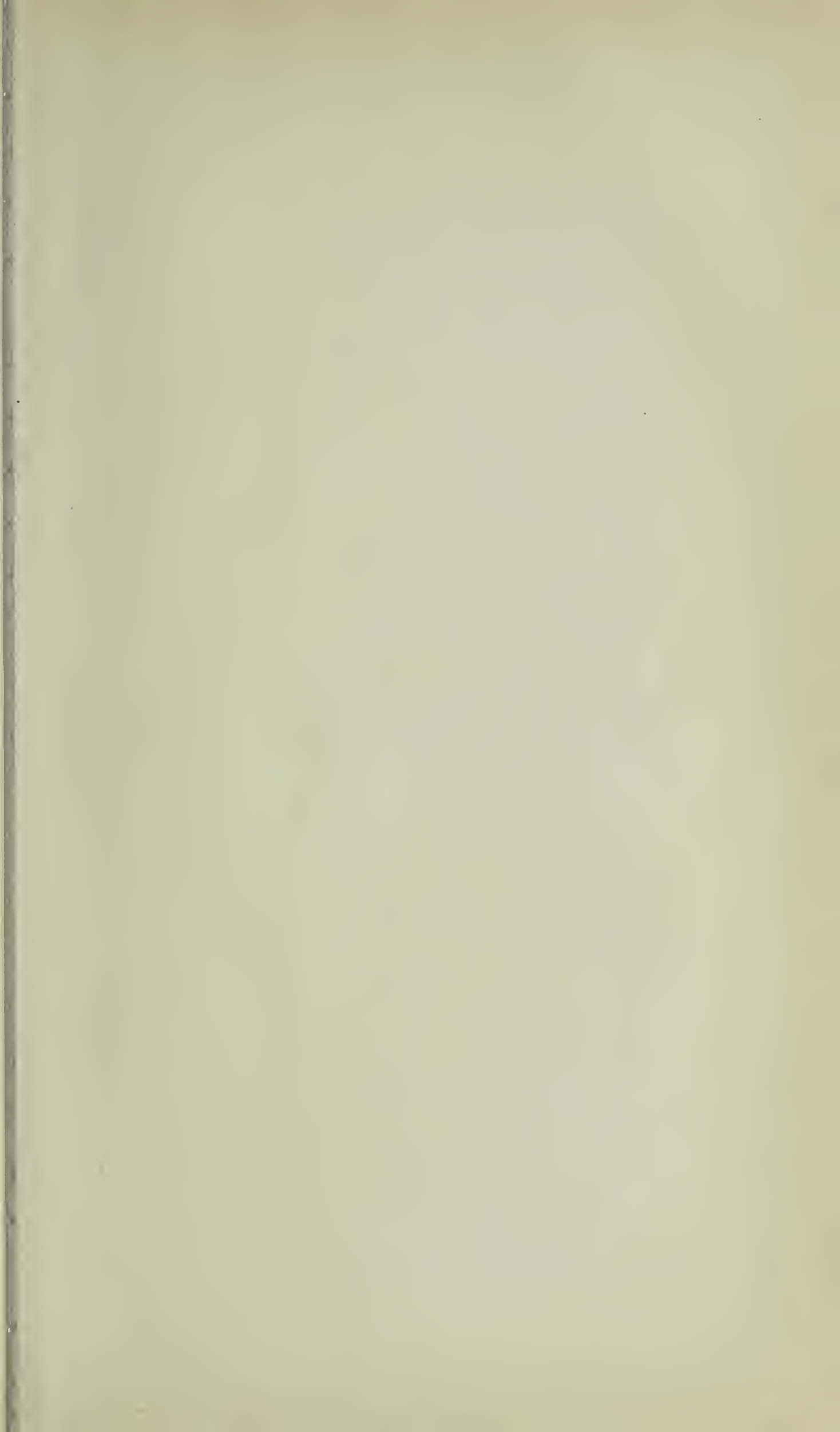
- 36 ✓ 20* for "Ca" read "CaO."
 37 ✓ 2 „ "T. E. WOLFF" read "JOHN E. WOLFF."
 110 ✓ bottom „ "Mauzelins" read "Mauzelius."
 197 ✓ 23 „ "SEBEBLIEN" „ "SEBELIEN."
 371 ✓ 22 „ "Přizibram" „ "Przibram."
 374 ✓ 17 after "Hornblende" insert "Hastingsite."
 480 ✓ 7 for "FREDERICO SHICKENDANTZ" read "FEDERICO SCHICKENDANTZ."
 576 ✓ ~~10*~~ „ "Dumortierite" read "Dumortierite."
 596 ✓ ~~10*~~ } „ "JOHN NORMAN LOCKYER," read "JOSEPH NORMAN LOCKYER."
 597 ✓ 3 & 20 }
 655 ✓ 25 „ "Water" read "Waters."
 „ ✓ 26 „ "1895" read "1896."
 „ ~~18*~~ „ "mineral" read "rock." — ?
 659 ✓ 6 „ "; by" read "and."

INDEX.

Page col.

- 699 ✓ 1 insert Dixon, Augustus Edward, thiocarbimides derived from complex fatty acids, T., 1593; P., 1896, 223.
 708 ✓ 2 „ Hada, Seihachi, how mercurous and mercuric salts change into each other, T., 1667; P., 1896, 182.
 724 ✓ 2 for "Luxmore" read "Luxmoore."
 898 ✓ 2 15* 14* for "d-iso-Propylpropane dd_1d_1 -tricarboxylic" read α -iso-Propylpropane $\alpha\alpha_1\alpha_1$ -tricarboxylic."
 929 ✓ 2 top line delete "salts," after "Magnesium."
 990 ✓ 1 3 after "Propionic acid" insert " β -iodo-."

* From bottom.



[illegible]

UNIVERSITY OF ILLINOIS-URBANA



3.0112 062446718